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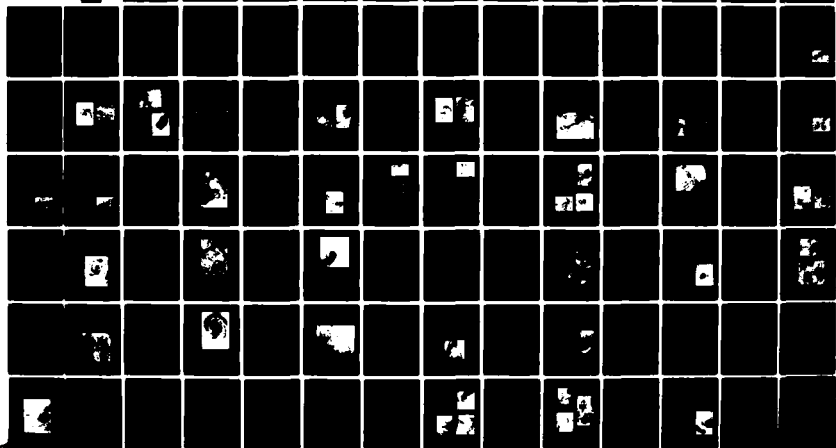
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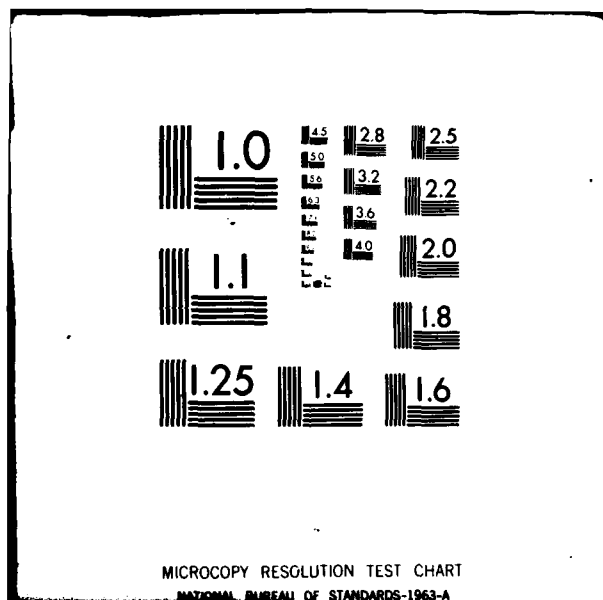
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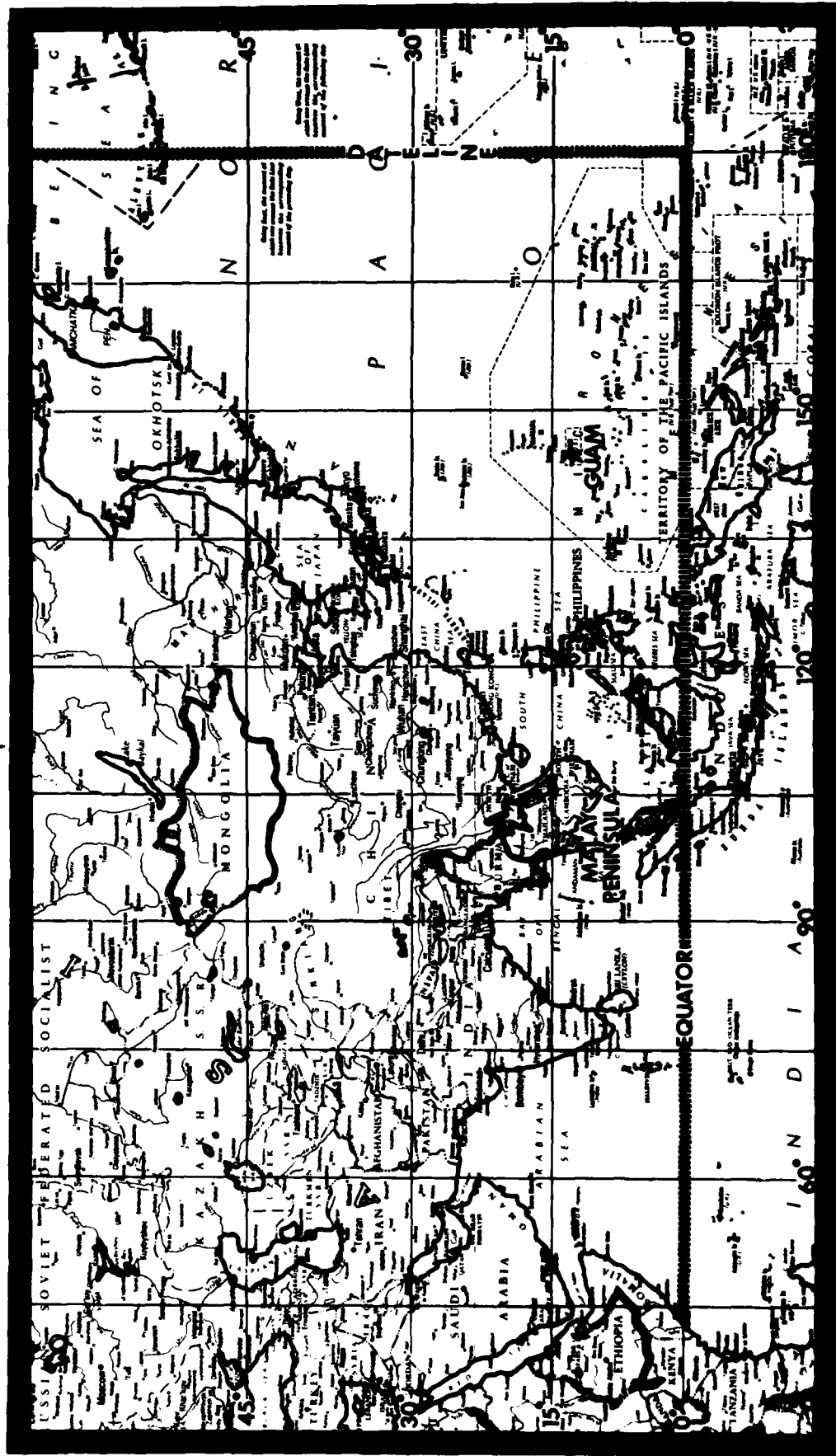
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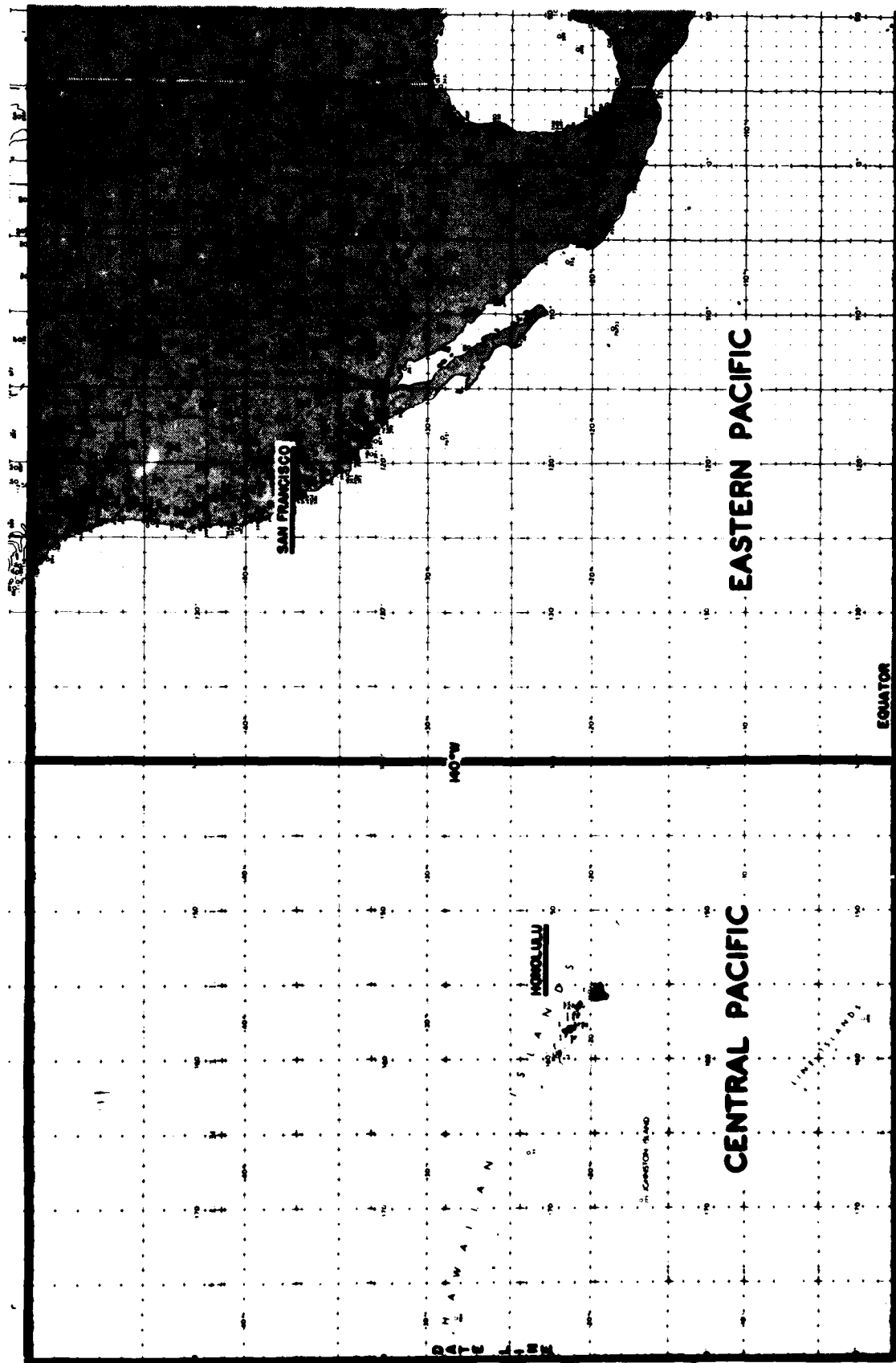
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Indian Ocean Area (Malay Peninsula to Africa)

Pacific Area (Dateline to Malay Peninsula)

## AREA OF RESPONSIBILITY - JOINT TYPHOON WARNING CENTER, GUAM



**Areas of Responsibility - Central and Eastern Pacific Hurricane Centers**

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**CORRECTIONS TO ANNEX B - for 1978 and 79 Annual Typhoon Reports  
(ATR)**

**1. The following tropical cyclones have aircraft fix data  
(eye characteristics) listed incorrectly:**

**1978 ATR**

**RITA  
VIOLA**

**1979 ATR**

**VERA  
TIP  
OWEN**

**2. The diameters of circular and concentric eye walls are  
incorrectly listed under the EYE ORIENTATION column. (Only  
elliptical eye walls have an orientation specified. These are  
specified correctly.) The misplaced diameters must be divided  
by 10 to obtain the correct figure and located in the EYE  
DIAMETER column.**

# Annual Typhoon Report 1979.

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Jan-Dec 79,

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FRONT COVER: Super Typhoon Tip near maximum intensity of 160 kt (82 m/sec), 11 October 1979, 2127Z. The minimum sea-level pressure was 870 mb and the associated circulation pattern was 1200 nm (2222 km) in diameter at that time. Details on Tip can be found on page 72. (DMSP imagery)

## FOREWORD

The Annual Typhoon Report is prepared by the staff of the Joint Typhoon Warning Center (JTWC). JTWC is a combined USAF/USN entity operating under the command of the U. S. Naval Oceanography Command Center, Guam. The senior Air Force Officer assigned is designated as Director, JTWC and is responsible to the Commanding Officer, U. S. Naval Oceanography Command Center, Guam for the operation of the JTWC. The senior Naval Officer of the JTWC is designated as the Deputy Director/Operations Officer. The JTWC was established by CINCPACFLT message 280208Z April 1959 when directed by CINCPAC message 230233Z April 1959. Its operation is guided by the CINCPACINST 3140.1 (series).

The Naval Oceanography Command Center/Joint Typhoon Warning Center, Guam has the responsibility to:

- (1) Provide continuous meteorological watch of all tropical activity north of the equator, west of the Date Line, and east of the African coast (JTWC area of responsibility) for potential tropical cyclone development.
- (2) Provide warnings for all significant tropical cyclones in the assigned area of responsibility.
- (3) Determine tropical cyclone reconnaissance requirements and assign priorities.

(4) Conduct an annual post-analysis of all tropical cyclones occurring within the JTWC area of responsibility and prepare an Annual Typhoon Report for issuance to interested agencies.

(5) Conduct tropical cyclone forecasting and detection research as practicable.

In the event of incapacitation of the JTWC, the alternate (AJTWC) assumes the responsibility for issuing warnings. The U. S. Naval Western Oceanography Center, Pearl Harbor, Hawaii is designated as the AJTWC. Assistance in determining tropical cyclone reconnaissance requirements and in obtaining reconnaissance data is provided by Detachment 4, 1st Weather Wing, Hickam AFB, Hawaii.

The meteorological services of the United States are planning to implement the metric system of measurement over the next few years. Some civilian and military agencies have started the education program by showing the metric equivalents to current units of measure. This Annual Typhoon Report includes metric equivalents to most measures.

Unless otherwise stated, all satellite data used in this ATR are Air Force Air Weather Service DMSP Data as acquired by OL-C, 27CS personnel and analyzed by Det 1, 1WW personnel colocated with the JTWC at Nimitz Hill, Guam.

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## CHAPTER I - OPERATIONAL PROCEDURES

### 1. GENERAL

Routine services provided by the Joint Typhoon Warning Center (JTWC) include the following: (1) Significant Tropical Weather Advisories issued daily describing all tropical disturbances and their potential for further development; (2) Tropical Cyclone Formation Alerts issued whenever interpretation of satellite and synoptic data indicates likely formation of a significant tropical cyclone; (3) Tropical Cyclone Warnings issued four times daily for significant tropical cyclones; and (4) Prognostic Reasoning messages issued twice daily for tropical storms and typhoons in the Pacific area.

JTWC responds to changing requirements of activities serviced. Therefore, contents of routine services are subject to change from year to year usually as a result of deliberations at the Tropical Cyclone Conference.

### 2. DATA SOURCES

#### a. COMPUTER PRODUCTS:

The Naval Oceanography Command Center (NAVOCEANCOMCEN) Guam provides computerized meteorological/oceanographic products for JTWC. In addition, the standard array of synoptic-scale computer analyses and prognostic charts are available from the Fleet Numerical Oceanography Center (FLENUMOCEANCEN) at Monterey, California. With the installation of the Naval Environmental Display Stations (NEDS) during 1978, JTWC now has very timely access to necessary FLENUMOCEANCEN products and is thereby able to more efficiently and effectively use this information.

#### b. CONVENTIONAL DATA:

Conventional meteorological data are defined as surface and upper-air observations from island, ship and land stations plus weather observations from commercial and military aircraft (AIREPS). Conventional data charts are prepared daily at 0000Z and 1200Z for the surface, 700 mb, and 500 mb levels. A chart of upper-air data is prepared which utilizes 200 mb rawinsonde data and AIREPS above 29,000 ft within 6 hours of the 0000Z and 1200Z synoptic times.

#### c. AIRCRAFT RECONNAISSANCE:

Aircraft weather reconnaissance data are invaluable in the positioning of centers of developing systems and essential for the accurate determination of the eye/center, maximum intensity, minimum sea-level pressure and radius of significant winds exhibited by tropical cyclones. Winds and pressure-height data at the 500 and/or 400 mb level, provided by reconnaissance aircraft while enroute to, or returning from, fix missions, are also used to supplement the sparse data in the tropics and subtropics. These data are plotted on large-scale sectional charts for each mission flown. A comprehensive discussion of aircraft weather reconnaissance is presented in Chapter II.

#### d. SATELLITE RECONNAISSANCE:

Meteorological satellite data from the Defense Meteorological Satellite Program (DMSP) and the National Oceanic and Atmospheric Administration played a major role in the early detection and tracking of tropical cyclones in 1979. A discussion of this role is presented in Chapter II.

#### e. RADAR RECONNAISSANCE:

During 1979, as in recent years, land radar coverage was utilized extensively when available. Once a storm moved within the range of a land radar site, reports were usually received hourly. Use of radar during 1979 is discussed in Chapter II.

### 3. COMMUNICATIONS

a. JTWC currently has access to three primary communications circuits:

(1) The Automated Digital Network (AUTODIN) is used for dissemination of warnings and other related bulletins to Department of Defense installations. These messages are relayed for further transmission over U. S. Navy Fleet Broadcasts, U. S. Coast Guard CW (continuous wave morse code) and voice communications. Inbound message traffic for JTWC is received via AUTODIN addressed to NAVOCEANCOMCEN GUAM.

(2) The Air Force Automated Weather Network (AWN) provides weather data to JTWC through a dedicated circuit from the automated digital weather switch (ADWS) at Clark AB, R.P. The ADWS selects and routes the large volume of meteorological reports necessary to satisfy JTWC requirements for the right data at the right time. Weather bulletins prepared by JTWC are inserted into the AWN circuit by the Nimitz Hill Naval Telecommunications Center (NTCC) of the Naval Communications Area Master Station Western Pacific.

(3) The Naval Environmental Data Network (NEDN) provides the communications link with the computers at FLENUMOCEANCEN. JTWC is able to both receive environmental data from FLENUMOCEANCEN and access the computers directly to run various programs.

b. Besides providing forecasters with the ability to rapidly access computer products, the NEDS has recently become the backbone of the JTWC communications system. AUTODIN and AWN message tapes can now be prepared by JTWC personnel for insertion into the AUTODIN and AWN circuits by the NTCC. The NEDS is also used by the TDO to request forecast aids which are processed by the computers at Monterey and transmitted back to the TDO over the NEDN circuit.

### 4. ANALYSES

A composite surface/gradient level (3000 ft) manual analysis is accomplished on the 0000Z and 1200Z conventional data. Analysis of the wind field using streamlines is stressed for tropical and subtropical

regions. Analysis of the pressure field is stressed for higher latitudes and in the vicinity of tropical cyclones.

Manual analysis of the 500 mb level is accomplished on the 0000Z and 1200Z data. Although the analysis of the 500 mb height field is stressed, knowledge of the wind field to more clearly delineate steering currents is equally important.

A composite upper-tropospheric manual analysis, utilizing rawinsonde data from 300 mb through 100 mb, wind directions extracted from satellite data by Det 1, LWW and AIREPS (plus or minus 6 hours) at or above 29,000 feet is accomplished on 0000Z and 1200Z data daily. Wind and height data are used to arrive at a representative analysis of tropical cyclone outflow patterns, of steering currents and of areas that may indicate tropical cyclone intensity change. All charts are hand plotted over areas of tropical cyclone activity to provide all available data as soon as possible to the TD0. These charts are augmented by the computer-plotted charts for the final analyses.

Additional sectional charts at intermediate synoptic times and auxiliary charts such as checkerboard diagrams and pressure-change charts are also analyzed during periods of significant tropical cyclone activity.

## 5. FORECAST AIDS

### a. CLIMATOLOGY:

Climatological publications utilized during the 1979 typhoon season include previous JTWC Annual Typhoon Reports and climatic publications from local sources, Naval Environmental Prediction Research Facility, Naval Postgraduate School, Air Weather Service, First Weather Wing and Chanute Technical Training Center. Publications from other Air Force and Navy activities, various universities and foreign countries are also used by the JTWC.

### b. OBJECTIVE TECHNIQUES:

The following objective techniques were employed in tropical cyclone forecasting during 1979. A description of these techniques is presented in Chapter IV.

- (1) TYFN75 (Analog)
- (2) MOHATT (Steering)
- (3) 12 HR EXTRAPOLATION
- (4) CLIMATOLOGY
- (5) HPAC (Combined extrapolation and climatology)
- (6) TROPICAL CYCLONE MODEL (Dynamic)
- (7) INJAH74 (Analog)
- (8) CYCLOPS (Steering)
- (9) TYAN78 (Analog)

## 6. FORECASTING PROCEDURES

### a. INITIALIZATION:

In the preparation of each warning, the actual surface location (fix) of the tropical cyclone eye/center just prior to (within three hours of) warning time is of prime importance. JTWC uses the Selective Reconnaissance Program (SRP) to levy an optimum mix of aircraft, satellite and radar resources to obtain fix information. When tropical cyclones are either poorly defined or the actual surface location cannot be determined, or when conflicting fix information is received, the "best estimate" of the surface location is subjectively determined from the analysis of all available data. If fix data are not available due to reconnaissance platform malfunctions or communication problems, synoptic data or extrapolation from previous fixes are used. The initial forecast (warning time) position is then obtained by extrapolation using the current fix and a "best track" of the cyclone movement to date.

### b. TRACK FORECASTING:

An initial forecast track is developed based on the previous forecast and the objective techniques. This initial track is subjectively modified based on the following:

(1) The prospects for recurvature are evaluated. This evaluation is based primarily on present and forecast position and amplitude of middle tropospheric mid-latitude troughs from the latest 500 mb analysis and numerical prognoses.

(2) Determination of steering level is partly influenced by maturity and vertical extent of the system. For mature cyclones located south of the 500 mb subtropical ridge, forecast changes in speed of movement are closely correlated with forecast changes in the intensity of the ridge. When steering currents are very weak, the tendency for cyclones to move northward due to their internal forces is an important consideration.

(3) The proximity of the tropical cyclone to other tropical cyclones is evaluated to determine if there is a possibility of Fujiwhara interaction.

(4) Over the 12- to 72-hr forecast spectrum, speed of movement during the early time frame is biased toward persistence (12-hr extrapolation) while that near the end of the time frame is biased towards objective techniques and climatology.

(5) A final check is made against climatology to determine the likelihood of the forecast track. If the forecast deviates greatly from climatology, the forecast rationale is reappraised and the track adjusted as necessary.

### C. INTENSITY FORECASTING:

In forecasting intensity, heavy reliance is placed on aircraft reconnaissance reports, the Dvorak satellite interpretation model, wind and pressure data from ships and land stations in the vicinity of the cyclone, and the objective techniques. Additional considerations are the position and intensity of the tropical upper-tropospheric trough (TUTT), extent and intensity of upper-level outflow, sea-surface temperature, terrain influences, speed of movement and proximity to an extratropical environment.

## 7. WARNINGS

Tropical cyclone warnings are issued when a definite closed circulation is evident and maximum sustained wind speeds are forecast to increase to 34 or more knots within 48 hours, or the cyclone is in such a position that life or property may be endangered within 72 hours. Warnings are also issued in other situations if it is determined that there is a need to alert military and civil interests to conditions which may become hazardous in a short period of time. Each tropical cyclone warning is numbered sequentially and includes the initial warning time, eye/center position, intensity, the radial extent of 30, 50 and 100 knot surface winds (when applicable), the levied reconnaissance platform used, the instantaneous speed and direction of movement of the cyclone's surface center at warning time and the forecast information. The forecast intervals for all tropical cyclones, regardless of intensity, are 12-, 24-, 48- and 72-hr. Warnings within the JTWC Pacific area are issued within two hours of 0000Z, 0600Z, 1200Z and 1800Z with the constraint that two consecutive warnings may not be more than seven hours apart. Warnings in the JTWC Indian Ocean area are issued within two hours of 0200Z, 0800Z, 1400Z and 2000Z with the constraint that two consecutive warnings may not be more than seven hours apart. These variable warning times allow for maximum use of all available reconnaissance platforms and more effectively distribute the workload in multiple cyclone situations. If warnings are discontinued and a cyclone reintensifies, warnings are numbered consecutively from the last warning issued. Warning forecast positions are verified against the corresponding post-

analysis "best track" positions. A summary of the verification results for 1979 is presented in Chapter IV.

## 8. PROGNOSTIC REASONING MESSAGE

In the Pacific Area, prognostic reasoning messages are transmitted based on the 0000Z and 1200Z warnings or whenever the previous reasoning is no longer valid. This plain language message is intended to provide users with the reasoning behind the latest JTWC forecast. Prognostic reasoning messages are not prepared for tropical depressions nor for cyclones in the Indian Ocean area.

For the 1979 season, JTWC included confidence statements for the 24 and 48-hour forecasts. The confidence values were percentage probabilities that the 24-hour forecast position error would be less than 100 nm and less than 150 nm, respectively, and that the 48-hour error would be less than 200 nm and less than 300 nm, respectively. These probabilities were based on objective data from error analysis studies of past cyclones and were a function of latitude, longitude, storm intensity, organization and the number of western Pacific storms in existence.

Prognostic reasoning information applicable to all customers is provided in the remarks section of warnings when significant forecast changes are made or when deemed appropriate by the TDO.

## 9. SIGNIFICANT TROPICAL WEATHER ADVISORY

This plain language message, summarizing significant weather in the entire JTWC area of responsibility, is issued by 0600Z daily. It contains a detailed, non-technical description of all significant tropical disturbances and the JTWC evaluation of potential for significant tropical cyclone development within the 24-hour forecast period.

## 10. TROPICAL CYCLONE FORMATION ALERT

Alerts are issued whenever interpretation of satellite and other meteorological data indicates significant tropical cyclone formation is likely. These alerts will specify a valid period not to exceed 24 hours and must either be cancelled, reissued or superseded by a warning prior to expiration of the valid period.

## CHAPTER II RECONNAISSANCE AND FIXES

### 1. GENERAL

The Joint Typhoon Warning Center depends on reconnaissance to provide necessary, accurate and timely meteorological information in support of each warning. JTWC relies primarily on three sources of reconnaissance: aircraft, satellite and radar. Optimum utilization of all available reconnaissance resources is obtained through use of the Selective Reconnaissance Program (SRP) whereby various factors are considered in selecting a specific reconnaissance platform for each warning. These factors include: cyclone location and intensity, reconnaissance platform capabilities and limitations, and the cyclone's threat to life/property afloat and ashore. A summary of reconnaissance fixes received during 1979 is included in Section 6.

### 2. RECONNAISSANCE AVAILABILITY

#### a. Aircraft:

Aircraft weather reconnaissance is performed in the JTWC area of responsibility by the 54th Weather Reconnaissance Squadron (54 WRS). The squadron, presently equipped with six WC-130 aircraft, is located at Andersen Air Force Base, Guam. From July through October, augmentation by the 53rd WRS at Keesler Air Force Base, Mississippi brings the total number of available aircraft to nine. The JTWC reconnaissance requirements are provided daily throughout the year to the Tropical Cyclone Aircraft Reconnaissance Coordinator (TCARC). These requirements include area(s) to be investigated, tropical cyclone(s) to be fixed, fix times and forecast positions of fixes. The following priorities are utilized in acquiring meteorological data from aircraft, satellite and land-based radar in accordance with CINCPACINST 3140.1N:

"(1) Investigative flights and vortex or center fixes for each scheduled warning in the Pacific area of responsibility. One aircraft fix per day of each cyclone of tropical storm or typhoon intensity is desirable.

(2) Center or vortex fixes for each scheduled warning of tropical cyclones in the Indian Ocean Area of responsibility.

(3) Supplementary fixes.

(4) Synoptic data acquisition."

As in previous years, aircraft reconnaissance provided direct measurements of height, temperature, flight-level winds, sea level pressure, estimated surface winds (when observable) and numerous additional parameters. The meteorological data are gathered by the Aerial Reconnaissance Weather Officers

(ARWO) and dropsonde operators of Detachment 4, Hq AWS who flew with the 54th. These data provide the Typhoon Duty Officer (TDO) indications of changing cyclone characteristics, radius of cyclone associated winds, and present cyclone position and intensity. Another important aspect of this data is its availability for research in tropical cyclone analysis and forecasting. Aircraft reconnaissance will become even more important in years to come when high-resolution tropical cyclone dynamic steering programs will require a dense input of wind and temperature data.

#### b. Satellite

Satellite fixes from USAF ground sites and USN ships provide day and night coverage in the JTWC area of responsibility. Interpretation of this satellite imagery provides cyclone positions and estimates of storm intensities through the Dvorak technique (for daytime passes).

Detachment 1, 1st Weather Wing, which receives and processes DMSP data, is the primary fix site for the northwestern Pacific. DMSP fix positions received at JTWC from the Air Force Global Weather Central (AFGWC), Offutt Air Force Base, Nebraska were the major source of satellite data for the Indian Ocean. GOES fixes were also provided by the National Environmental Satellite Service, Honolulu, Hawaii for tropical cyclones near the dateline.

#### c. Radar

Land radar provides positioning data on well developed cyclones when in proximity (usually within 175 nm of the radar site) of the Republic of the Philippines, Taiwan, Hong Kong, Japan, the Republic of Korea, Kwajalein, and Guam.

#### d. Synoptic

In 1979, the JTWC also determined tropical cyclone positions based on the analysis of the surface/gradient level synoptic data. These positions were helpful in situations where the vertical structure of the tropical cyclone was weak or accurate surface positions from aircraft were not available due to flight restrictions.

### 3. AIRCRAFT RECONNAISSANCE SUMMARY

During the 1979 tropical season, the JTWC levied 289 six-hourly vortex fixes and 52 investigative missions. In addition to the levied vortex fixes, 150 supplemental fixes were also obtained. The number of levied investigative missions has increased steadily over the past four years in response to JTWC's increased efforts to detect initial tropical cyclone development.

Of 1979's 28 tropical cyclones, investigative missions were not flown on four. The average vector error for all aircraft fixes received at the JTWC during 1979 was 13.0 nm (24.1 km).

Reconnaissance effectiveness is summarized in Table 2-1 using the criteria as set forth in CINCPACINST 3140.1N.

TABLE 2-1. AIRCRAFT RECONNAISSANCE EFFECTIVENESS

EFFECTIVENESS	NUMBER OF LEVIED FIXES	PERCENT
COMPLETED ON TIME	258	89.3
EARLY	2	0.7
LATE	15	5.2
MISSED	14	4.8
TOTAL	289	100.0

LEVIED VS. MISSED FIXES

	LEVIED	MISSED	PERCENT
AVERAGE 1965-1970	507	10	2.0
1971	802	61	7.6
1972	624	126	20.2
1973	227	13	5.7
1974	358	30	8.4
1975	217	7	3.2
1976	317	11	3.5
1977	203	3	1.5
1978	290	2	0.7
1979	289	14	4.8

#### 4. SATELLITE RECONNAISSANCE SUMMARY

The Air Force provides satellite reconnaissance support to JTWC using imagery data from DMSP polar orbiting spacecraft. Data from similar NOAA spacecraft (TIROS-N/NOAA-6) were not available to the tactical sites of the network but could be processed on a backup basis by the Air Force Global Weather Central (AFGWC).

The DMSP network consists of both tactical and centralized facilities. Tactical DMSP sites are located at Nimitz Hill, Guam; Clark AB, Philippines; Kadena AB, Japan; Osan AB, Korea; and Hickam AFB, Hawaii. These sites provide a combined coverage that blankets the JTWC area of responsibility in the western Pacific from near the dateline westward to the Malay Peninsula.

The centralized member of the DMSP network is the Air Force Global Weather Central located at Offutt AFB, Nebraska. AFGWC receives worldwide satellite imagery coverage four times daily from two DMSP spacecraft. In addition, AFGWC has the capability to process either TIROS-N or NOAA-6 should one of the primary DMSP spacecraft fail. Imagery taken over the JTWC area of responsibility is recorded on board

the spacecraft and later downlinked to AFGWC via command/readout sites and communications satellites. With their coverage, AFGWC is able to fix a storm anywhere within the JTWC area of responsibility. As the only site in the network that receives coverage over the entire Indian Ocean, AFGWC has the primary responsibility for satellite reconnaissance in this area as well as a small portion of the central Pacific near the dateline. On occasion, AFGWC is tasked to provide storm positions in the western Pacific as backup to the tactical sites.

The thread that ties the network together is Det 1, 1LW collocated with JTWC atop Nimitz Hill, Guam. Based on available satellite coverage, Det 1 coordinates satellite reconnaissance requirements with JTWC and tasks the individual DMSP sites to provide the necessary storm fixes. The tasking concept is to fix every storm or tropical disturbance (alert area) once from each satellite pass over the area of the storm. When a satellite position is required as the basis for a warning (levy), a dual-site tasking concept is applied. Under this concept, two sites are tasked to fix the storm off the same satellite pass. This provides the necessary redundancy to virtually guarantee JTWC a successful satellite fix of the storm. Using the dual-site tasking concept, the satellite reconnaissance network was able to meet 98 percent of JTWC's satellite fix requirements. Dual-site tasking is not available over the Indian Ocean since only AFGWC receives the satellite coverage for most of that area.

The network provides JTWC with several products and services. The main service is one of surveillance. With the exception of Osan, each site reviews its daily coverage for any indications of development. If an area shows indications of development, JTWC is notified. Once JTWC issues either an alert or warning, the network is tasked to provide three products: storm positions, storm intensity estimates, and 24-hour storm intensity forecasts. Satellite storm positions are assigned position code numbers (PCN) depending on the availability of geography for precise gridding and the degree of organization of the storm's circulation center (Table 2-2). During 1979, the network provided JTWC with 1970 satellite fixes of tropical cyclones in warning status. A comparison of those fixes made on numbered tropical cyclones with their corresponding JTWC best track positions is shown in Table

TABLE 2-2. POSITION CODE NUMBERS

PCN	METHOD OF CENTER DETERMINATION/GRIDDING
1	EYE/GEOGRAPHY
2	EYE/EPHEMERIS
3	WELL DEFINED CC/GEOGRAPHY
4	WELL DEFINED CC/EPHEMERIS
5	POORLY DEFINED CC/GEOGRAPHY
6	POORLY DEFINED CC/EPHEMERIS

CC=Circulation Center

TABLE 2-3. MEAN DEVIATIONS (NM) OF DMSF DERIVED TROPICAL CYCLONE POSITIONS FROM JTWC BEST TRACK POSITIONS. NUMBER OF CASES SHOWN IN PARENTHESIS.

PCN	WESTPAC 1974-1978 AVERAGE (ALL SITES)	WESTPAC 1979 (ALL SITES)	INDIAN OCEAN 1979 (ALL SITES)
1	13.3 (178)	14.4 (268)	13.5 ( 7)
2	18.5 ( 68)	17.9 ( 61)	23.1 ( 7)
3	21.2 (270)	18.6 (341)	23.4 (16)
4	25.6 (101)	20.5 ( 70)	18.0 ( 8)
5	37.1 (368)	37.8 (605)	34.1 (22)
6	47.2 (190)	43.3 (232)	42.2 (66)
1&2	14.8 (246)	15.0 (329)	18.3 (14)
3&4	22.0 (371)	18.9 (411)	21.6 (24)
5&6	40.6 (558)	39.4 (837)	40.2 (88)

2-3. Estimates of the storm's current and 24-hour forecast intensity are made once each day by applying the Dvorak technique (NOAA Technical Memorandum NESS 45 as revised) to daylight visual data. Satellite derived storm positions, intensity estimates, and forecasts constitute the satellite portion of the JTWC forecast data base.

The availability of satellite data varied during the year. At the start, the network had access to three DMSF spacecraft: F-1 (late-morning), F-2 (mid-morning), and F-3 (sunrise). In June, a fourth DMSF spacecraft, F-4, was launched into a late morning orbit. The network had access to these four spacecraft until mid-September when F-1 failed. Three months later, in early December, F-3 failed reducing the active DMSF fleet to only two spacecraft with similar mid- to late-morning coverages. The network was able to partially compensate for this loss by depending on AFGWC to provide fixes for the entire network based on its unique ability to process TIROS-N as a replacement for F-3. Therefore, the 1979 season ended with available satellite coverage at its lowest point for the entire year.

Besides the network provided fixes, JTWC also receives satellite-derived storm positions from several secondary sources. These include: U.S. Navy ships equipped for satellite direct readout; the National Environmental Satellite Service using NOAA and GOES data; and the Naval Polar Oceanography Center, Suitland, Maryland using stored DMSF and NOAA data. Fixes from these secondary sources are not included in the network statistics.

## 5. RADAR RECONNAISSANCE SUMMARY

Sixteen of the 28 significant tropical cyclones occurring over the western North Pacific during 1979 passed within range of land based radars with sufficient cloud pattern organization to be fixed. The hourly and oftentimes, half-hourly land radar fixes that were obtained and transmitted to JTWC totaled 1143.

The WMO radar code defines three categories of accuracy: good (within 10 km (5.4 nm)), fair (within 10-30 km (5.4-16.2 nm)) and poor (within 30-50 km (16.2-27 nm)).

This year, 1139 radar fixes were coded in this manner; 25% were good, 29% fair and 46% poor. Compared to the JTWC best track, the mean vector deviation for land radar sites was 15 nm (28 km).

Of the 16 tropical cyclones which were monitored with land radar, 11 were typhoons: Alice, Cecil, Ellis, Hope, Irving, Judy, Mac, Owen, Sarah, Tip and Vera. These 11 typhoons accounted for 89% of all radar fixes received for this season. Excellent support through timely and accurate radar fix positioning allowed JTWC to track and forecast tropical cyclone movement through even the most difficult and erratic tracks.

The 54 WRS made four radar center fixes from their WC-130 aircraft when actual penetration was restricted. One ship radar center fix was received on Typhoon Bess. No radar fixes were received on Indian Ocean tropical cyclones.

## 6. TROPICAL CYCLONE FIX DATA

A total of 3318 fixes on 28 northwest Pacific tropical cyclones and 166 fixes on 7 northern Indian Ocean tropical cyclones were received at JTWC. Table 2-4, Fix Platform Summary, delineates the number of fixes per platform for each individual tropical cyclone. Season totals and percentages are also indicated.

Annex B lists individual fixes sequentially for each tropical cyclone. Fix data is divided into four categories: Satellite, Aircraft, Radar and Synoptic. Those fixes labeled with an asterisk (\*) were determined to be unrepresentative of the surface center and were not used in determining the best tracks. Within each category, the first three columns are as follows:

FIX NO. - Sequential fix number

TIME (Z) - GMT time in day, hours and minutes

FIX POSITION - Latitude and longitude to the nearest tenth of a degree

Depending upon the category, the remainder of the format varies as follows:

TABLE 2-4. FIX SUMMARY FOR 1979

FIX SUMMARY

	<u>AIRCRAFT</u>	<u>DMSP</u>	<u>TIROS-N</u>	<u>GOES3</u>	<u>RADAR</u>	<u>SYNOPTIC</u>	<u>TOTAL</u>
<u>WESTERN PACIFIC</u>							
TY ALICE	43	80	-	5	42	-	170
TY BESS	17	47	-	-	1*	-	65
TY CECIL	29	87	-	-	51	-	167
TS DOT	7	71	-	-	12	3	93
TD OS	-	20	-	-	11	2	33
TY ELLIS	12	66	-	-	14	7	99
TS FAYE	14	48	-	-	-	5	67
TD OS	1	29	-	-	-	7	37
ST HOPE	22	78	-	-	44	1	145
TS GORDON	8	40	-	-	25	-	73
TD 11	6	33	-	-	-	2	41
TY IRVING	25	124	-	-	148**	-	297
ST JUDY	26	140	-	-	177	2	345
TD 14	3	23	-	-	-	2	28
TS KEN	5	41	-	-	73	-	119
TY LOLA	17	63	-	-	-	-	80
TY MAC	14	86	-	-	55***	-	155
TS NANCY	-	33	-	-	-	15	48
TY OWEN	34	87	-	-	312	8	441
TS PAMELA	5	9	-	-	-	-	14
TS ROGER	6	32	-	-	-	6	44
TY SARAH	13	112	-	-	5	4	134
ST TIP	59	99	-	-	109	-	267
ST VERA	14	54	-	-	60***	9	137
TS WAYNE	11	44	-	-	-	1	56
TD 26	2	11	-	-	-	1	14
TY ABBY	40	66	7	-	-	3	116
TS BEN	4	20	2	-	7	-	33
<hr/>							
TOTAL	437	1643	9	5	1146	78	3318
% OF TOTAL NO. OF FIXES	13.1	49.5	.3	.2	34.6	2.3	100
<hr/>							
		<u>DMSP</u>	<u>TIROS-N</u>			<u>SYNOPTIC</u>	<u>TOTAL</u>
<u>INDIAN OCEAN</u>							
TC 17-79		28	5			-	33
TC 18-79		16	4			5	25
TC 22-79		8	2			2	12
TC 23-79		30	6			1	37
TC 24-79		19	3			-	22
TC 25-79		17	-			-	17
TC 26-79		20	-			-	20
<hr/>							
TOTAL		138	20			8	166
% OF TOTAL NO. OF FIXES		83	13			4	100
<hr/>							
* SHIP RADAR FIX							
** INCLUDES TWO ACFT RADAR FIXES							
*** INCLUDES ONE ACFT RADAR FIX							

#### a. Satellite

(1) ACCRY - Position Code Number (PCN) (see Sec. 5) or Confidence (CONF) number (see table 2-5) is listed depending on method used to determine the fix position.

TABLE 2-5. CONFIDENCE (CONF) NUMBERS AS A FUNCTION OF DVORAK T NUMBER AND RADIUS OF 90% PROBABILITY AREA (NM).

TROPICAL CYCLONE INTENSITY	CONF (1)	CONF (2)	CONF (3)
T1.5	60	120	170
T2.0	60	120	170
T2.5	60	120	170
T3.0	50	100	150
T3.5	45	90	140
T4.0	45	90	140
T4.5	45	90	140
T5.0	40	90	130
T5.5	40	80	130
T6.0	40	80	130
T6.5	30	70	120
T7.0	30	70	120
T7.5	30	60	100
T8.0	30	60	100

(2) DVORAK CODE - Intensity evaluation and trend utilizing DMSP visual satellite data. (For specifics refer to NOAA TM; NESS-45)

FOR TROPICAL  
TODAY'S T-NUMBER  
CURRENT INTENSITY  
NUMBER  
INDICATION  
OF ONGOING  
CHANGE  
PLUS  
T ( ) / ( ) MINUS / S ( ) / ( ) hrs  
LEAVE W

EXAMPLE: T5/6 MINUS/W1.5/24hrs.

(3) SAT - Specific satellite used for fix position (DMSP 35, 36, 37 or 39, TIROS-N or Geostationary Operational Environmental Satellite (GOES, 135W)).

(4) COMMENTS - For explanation of abbreviations see Appendix.

(5) SITE - ICAO call sign of the specific satellite tracking station.

#### b. Aircraft

(1) FLT LVL - The constant pressure surface level, in mb, maintained during the penetration. 700 mb is the normal level flown in developed cyclones due to turbulence factors with low-level missions flown at 1500 ft.

(2) 700 MB HGT - Minimum height of the 700 mb pressure surface within the vortex recorded in meters.

(3) OBS MSLP - If the surface center can be visually detected (e.g., in the eye), the minimum sea level pressure is obtained by a dropsonde released above the surface vortex center. If the fix is made at the 1500-foot level, the sea level pressure is extrapolated from that level.

(4) MAX-SFC-WND - The maximum surface wind (knots) is an estimate made by the ARMO based on sea state. This observation is limited to the region of the flight path, and may not be representative of the entire cyclone. Availability of data is also dependent upon the absence of undercast conditions and the presence of adequate illumination. The positions of the maximum flight level wind and the maximum observed surface wind do not necessarily coincide.

(5) MAX-FLT-LVL-WND - Wind speed (knots) at flight level is measured by the AN/APN 147 doppler radar system aboard the WC-130 aircraft. Values entered in this category represent the maximum wind measured prior to obtaining a scheduled fix. This measurement may not represent the maximum flight level wind associated with the tropical cyclone because the aircraft only samples those portions of the tropical cyclone along the flight path. In many instances the flight path may be through the weak sector of the cyclone. In areas of heavy rainfall, the doppler radar may track energy reflected from precipitation rather than from the sea surface; thus preventing accurate wind speed measurement. In obvious cases, such erroneous wind data will not be reported. In addition, the doppler radar system on the WC-130 restricts wind measurements to drift angles less than or equal to 27 degrees if the wind is normal to the aircraft heading.

(6) ACCRY - Fix position accuracy. Both navigational (OMEGA and LORAN) and meteorological (by the ARMO) estimates are given in nautical miles.

(7) EYE SHAPE - Geometrical representation of the eye based on the aircraft radar presentation. Reported only if center is 50% or more surrounded by wall cloud.

(8) EYE DIAM/ORIENTATION - Diameter of the eye in nautical miles. In case of an elliptical eye, the lengths of the major and minor axes and the orientation of the major axis are respectively listed.

#### c. Radar

(1) RADAR - Specific type of platform utilized for fix (land radar site, aircraft or ship).

(2) ACCRY - Accuracy of fix position (good, fair or poor) as given in the WMO ground radar weather observation code (FM20-V).

(3) EYE SHAPE - Geometrical representation of the eye given in plain language (circular, elliptical, etc.).

(4) EYE DIAM - Diameter of eye given in nautical miles.

(5) RADOB CODE - Taken directly from WMO ground weather radar observation code FM20-V. First group specifies the vortex parameters, while the second group describes the movement of the vortex center.

(6) RADAR POSITION - Latitude and longitude of tracking station given in tenths of a degree.

(7) SITE - WMO station number of the specific tracking station.

d. Synoptic

(1) INTENSITY ESTIMATE - TDO's analysis of low-level synoptic data to determine a cyclone's maximum sustained surface wind (knots).

(2) NEAREST DATA - Accuracy of fix based on distance (nautical miles) from the fix position to the nearest synoptic report or to the average distance of reports in data sparse cases.

## CHAPTER III SUMMARY OF TROPICAL CYCLONES

### 1. WESTERN NORTH PACIFIC TROPICAL CYCLONES

During 1979, the western North Pacific experienced a below normal year of tropical cyclone activity with a total of 28 cyclones (Table 3-1). By comparison, 1978 was a near normal year with 32 cyclones and 1977 was a near record low year with a total of 21 cyclones. Five significant tropical cyclones never developed beyond tropical depression (TD) stage, and nine developed into tropical storms (TS). Of the 14 cyclones that devel-

oped to typhoon (TY) stage, only 4 reached the 130 kt (67 m/sec) intensity necessary to be classified as a super typhoon (ST). This season, beginning with Typhoon Bess, tropical cyclones attaining tropical storm strength or greater were assigned names on an alternating male/female basis. This change was a result of the 1979 Tropical Cyclone Conference, and the list of names can be found in CINCPACINST 3140.1N CH-1. A similar but different series of cyclone names is used for eastern North Pacific and North Atlantic cyclones. Each tropical cyclone's

TABLE 3-1.

#### WESTERN NORTH PACIFIC

##### 1979 SIGNIFICANT TROPICAL CYCLONES

CYCLONE	TYPE	NAME	PERIOD OF WARNING	CALENDAR DAYS OF WARNING	MAX SFC WIND	MIN OBS SLP	NUMBER OF WARNINGS	DISTANCE TRAVELLED
01	TY	ALICE	01 JAN-14 JAN	14	110	930	51	2597
02	TY	BESS	20 MAR-25 MAR	6	90	958	21	1804
03	TY	CECIL	11 APR-20 APR	10	80	965	40	2535
04	TS	DOT	10 MAY-16 MAY	7	40	984	24	2876
05	TD	TD-05	23 MAY-24 MAY	2	30	998	6	2170
06	TY	ELLIS	01 JUL-06 JUL	6	85	955	22	1612
07	TS	FAYE	01 JUL-06 JUL	6	40	998	20	1837
08	TD	TD-08	24 JUL-25 JUL	2	20	1004	5	1264
09	ST	HOPE	27 JUL-03 AUG	10	130	898	33	3928
10	TS	GORDON	26 JUL-29 JUL	4	60	980	13	1058
11	TD	TD-11	03 AUG-06 AUG	4	25	997	14	1088
12	TY	IRVING	09 AUG-18 AUG	10	90	954	38	2732
13	ST	JUDY	16 AUG-26 AUG	11	135	887	39	2502
14	TD	TD-14	18 AUG-20 AUG	3	20	1006	9	605
15	TS	KEN	01 SEP-04 SEP	5	60	985	13	1418
16	TY	LOLA	02 SEP-08 SEP	7	90	950	23	1298
17	TY	MAC	15 SEP-24 SEP	10	70	984	35	1831
18	TS	NANCY	19 SEP-22 SEP	4	45	993	14	528
19	TY	OMEN	22 SEP-01 OCT	10	110	918	37	2151
20	TS	PAMELA	25 SEP-26 SEP	3	45	1002	6	984
21	TS	ROGER	03 OCT-07 OCT	6	45	985	16	1920
22	TY	SARAH	04 OCT-15 OCT	12	110	929	43	1194
23	ST	TIP	05 OCT-19 OCT	16	165	870	60	3972
24	ST	VERA	02 NOV-07 NOV	6	140	915	23	1868
25	TS	WAYNE	08 NOV-13 NOV	6	50	990	22	1559
26	TD	TD-26	01 DEC-02 DEC	2	30	998	6	1070
27	TY	ABBY	01 DEC-14 DEC	14	110	951	52	4044
28	TS	BEN	21 DEC-23 DEC	3	60	990	10	2245
1979 TOTALS				149*			695	

\*OVERLAPPING DAYS INCLUDED ONLY ONCE IN SUM.

maximum surface wind (MAX SFC WND), in knots, and minimum observed sea-level pressure (MIN OBS SLP), in millibars, were obtained from best estimates of all available data. The distance travelled, in nautical miles, was calculated from the JTWC official best track (see Annex A).

Table 3-2 provides further information on the monthly distribution of tropical cyclones and statistics on Tropical Cyclone Formation Alerts and Warnings. Even though there were 4 fewer cyclones this season compared to last season, there were 18 more warning days.

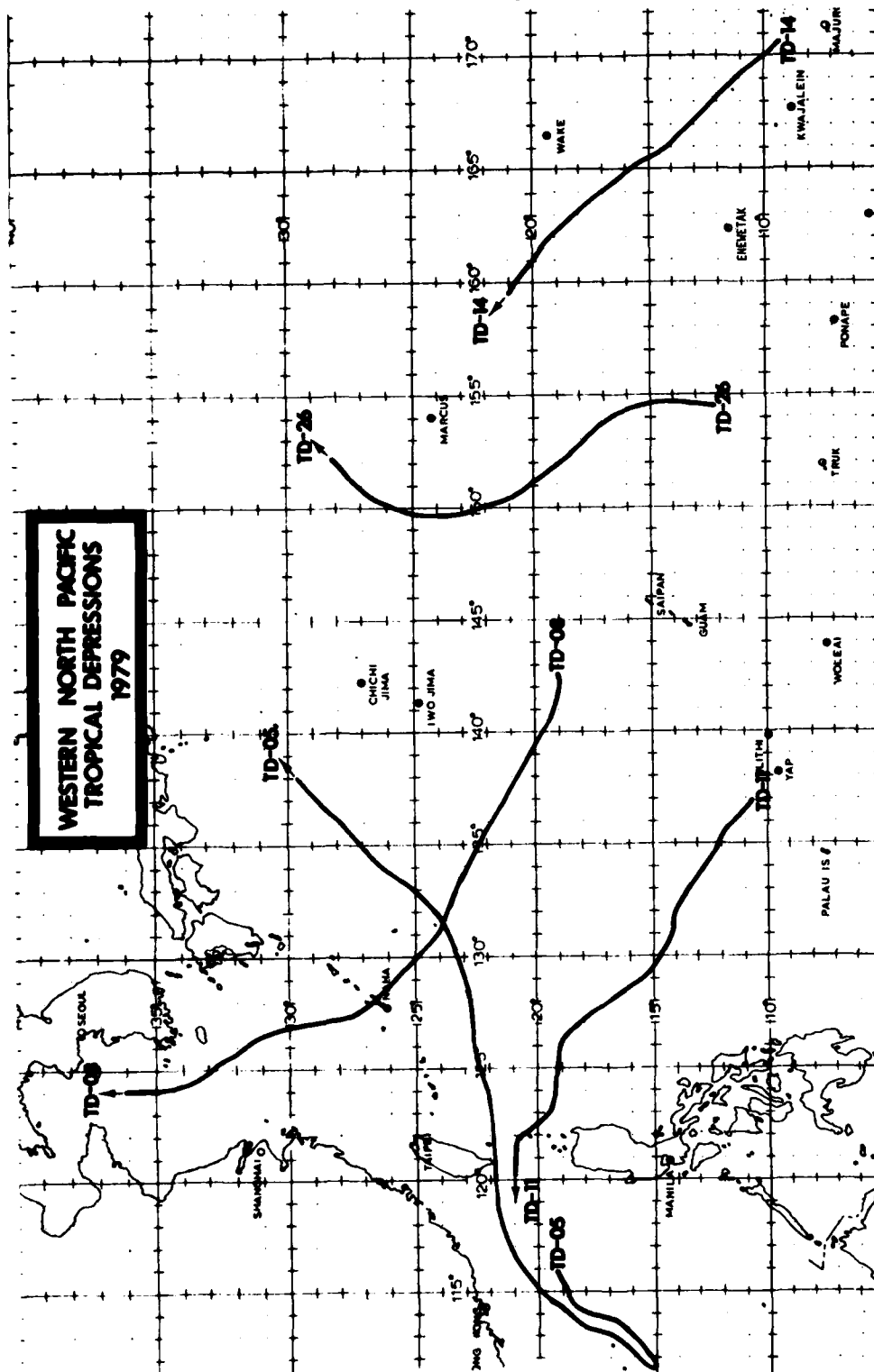
TABLE 3-2.

1979 SIGNIFICANT TROPICAL CYCLONE STATISTICS

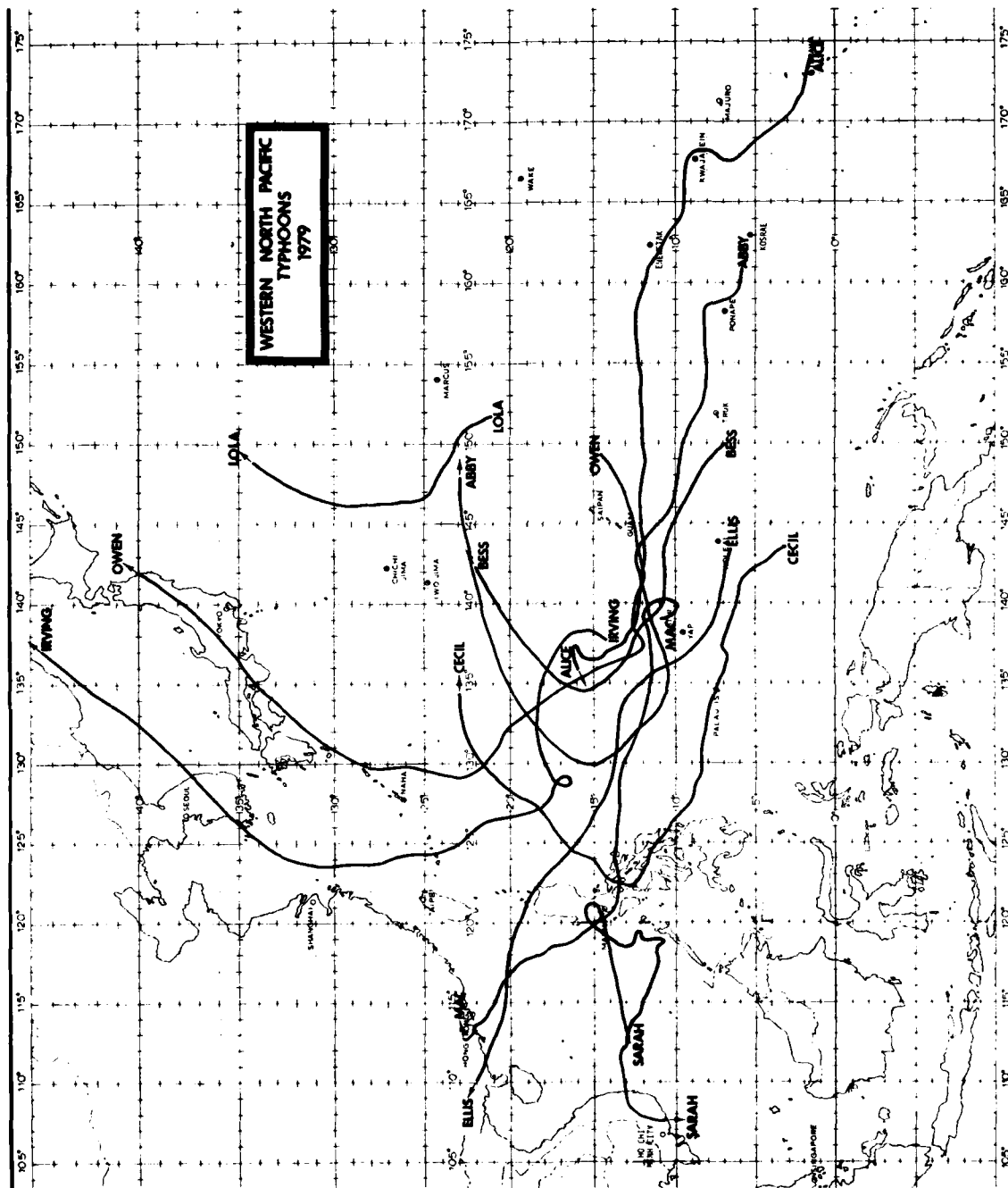
WESTERN NORTH PACIFIC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	TOTAL	(1959-78) AVERAGE
TROPICAL DEPRESSIONS	0	0	0	0	1	0	1	2	0	0	0	1	5	4.8
TROPICAL STORMS	0	0	0	0	1	0	2	0	4	1	1	1	10	10.0
TYPHOONS	1	0	1	1	0	0	2	2	2	2	1	1	13	18.0
ALL CYCLONES	1	0	1	1	2	0	5	4	6	3	2	3	28	32.8
(1959-78) AVERAGE	0.6	0.4	0.6	0.9	1.4	2.1	5.2	6.8	6.0	4.8	2.7	1.3	32.8	

FORMATION ALERTS    23 of the 27 (85%) Formation Alert Events developed into tropical cyclones.  
                              5 of the 28 (18%) tropical cyclones did not have a Formation Alert.

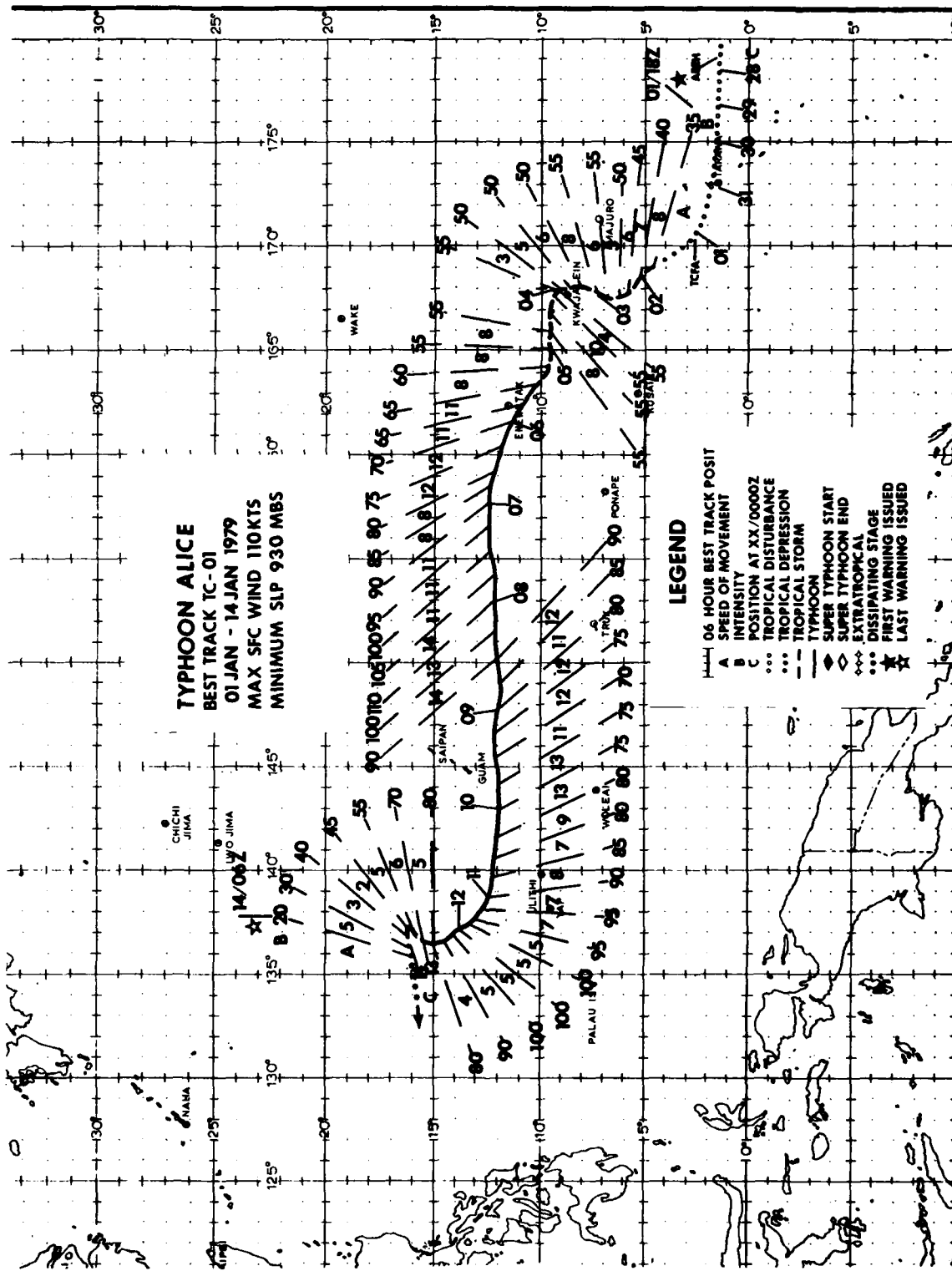
WARNINGS            Number of warning days: 149  
                              Number of warning days with 2 cyclones: 38  
                              Number of warning days with 3 or more cyclones: 5











Typhoon Alice, the first tropical cyclone of the 1979 season, was actually first sighted as a tropical disturbance on the 27th of December 1978. Being over the Gilbert Islands quite close to the equator, the potential for development was considered poor. A tropical cyclone formation alert was issued at 0300Z 1 January 1979 when satellite data showed the disturbance progressively increasing in organization. Soon after, the suspect area accelerated northwest to higher latitudes where development conditions were more favorable, and by 011800Z, tropical storm Alice was named. Post-analysis showed that the tropical depression stage began near 010000Z at low latitudes, contrary to the general rule that cyclones do not form close to the equator.

Although a climatologically unfavored period for western North Pacific tropical cyclone development, the fact that Alice did form supports the non-existence of a definitive "typhoon season" for WESTPAC; tropical cyclones are possible anytime of the year. The greatest forecasting difficulties and concomitant large forecast errors occurred during Alice's formative and dissipating stages. Double intensification also contributed to Alice's notoriety.

Early in her lifetime, Alice meandered through the Marshall Islands as if determined to visit each island. One week later, on 12 January 1979, President Carter declared the Marshall Islands a major disaster area.

A satellite reconnaissance fix at 022133Z showed Alice had moved northeastward when forecast to continue northwestward. Being a fix on a poorly defined satellite image (PCN 6), it was not taken verbatim; northwest movement continued to be forecast. An aircraft reconnaissance fix at 030053Z confirmed the earlier satellite fix as did a follow-on 030310Z aircraft fix. Post-analysis revealed that a mid-latitude, short-wave trough passed north of Alice during this time period. The trough extended deep enough into the tropics to weaken the mid-tropospheric ridge. This weakness permitted a southward intrusion of mid-latitude westerlies into Alice's vicinity, temporarily steering her northeastward. As the short-wave trough continued eastward, the subtropical ridge quickly reestablished itself north of Alice producing strong easterly steering flow, temporarily accelerating her from 4 to 10 kt (8 to 19 km/hr) toward the northwest when continued northeast movement was forecast. During this time, decision makers on Eniwetok (also within the Marshall Islands), noting the low forecast confidence stated on prognostic reasoning messages, kept a condition of readiness which paid off.

From the 6th to the 11th, Alice traveled due west. On the 8th, Alice attained 110 kt (57m/sec) intensity and simultaneously accelerated to a speed of 14 kt (26 km/hr) (the fastest observed along track), whereupon she began weakening slowly.

During the 9th, Alice began an unexpected northward movement trend and showed further weakening. Post-analysis of low-level synop-

tic data and satellite imagery (Fig. 3-01-1) indicated that an approaching frontal shear-line was the responsible agent. The shear-line began interacting with Alice while she was southeast of Guam. As Alice neared Guam, radar data from Andersen AFB and aircraft data indicated that Alice's previously well-defined wall cloud became larger and somewhat less organized. Cooler, drier air north of the shear-line was likely responsible for this weakening trend. A weakness in the subtropical ridge vertically above the shear-line apparently allowed for Alice's northward deviation.

The most unusual portion of Alice's track occurred during the final 3 days of Alice's life. Based on interpretation of PE progs, the subtropical ridge was expected to persist and maintain Alice in the easterlies. As a result, the JTWC forecasts (supported by the majority of objective forecast aids) indicated westward movement until 120000Z, 18 hours after Alice had actually begun tracking northwestward. The subtropical ridge weakened in response to a long-wave trough deepening over eastern Asia. Easterly steering currents in Alice's vicinity diminished and veered in direction, permitting a more northward track. Alice reached a secondary intensity maximum of 100 kt (51 m/sec) during this period due to her slowing in speed of movement, the increased absolute vorticity of higher latitudes and good outflow aloft.

By the 13th, Alice turned northeastward and began weakening rapidly. The subtropical ridge was now completely severed and upper-air westerlies were shearing Alice significantly in the vertical. Close proximity of yet another frontal shear-line contributed to further weakening. The biggest surprise, however, came when Alice's low-level circulation turned almost 180 degrees back toward the west at about 131200Z under the influence of strong, low-level easterlies and weakened rapidly in the strong, vertical-shear environment. As a result of vertical decoupling, Alice as a shallow depression, dissipated during the following 12-hour period.

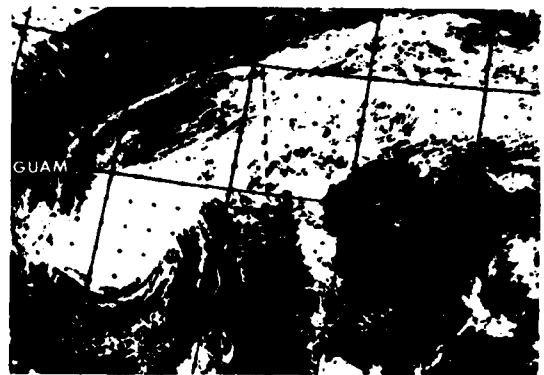
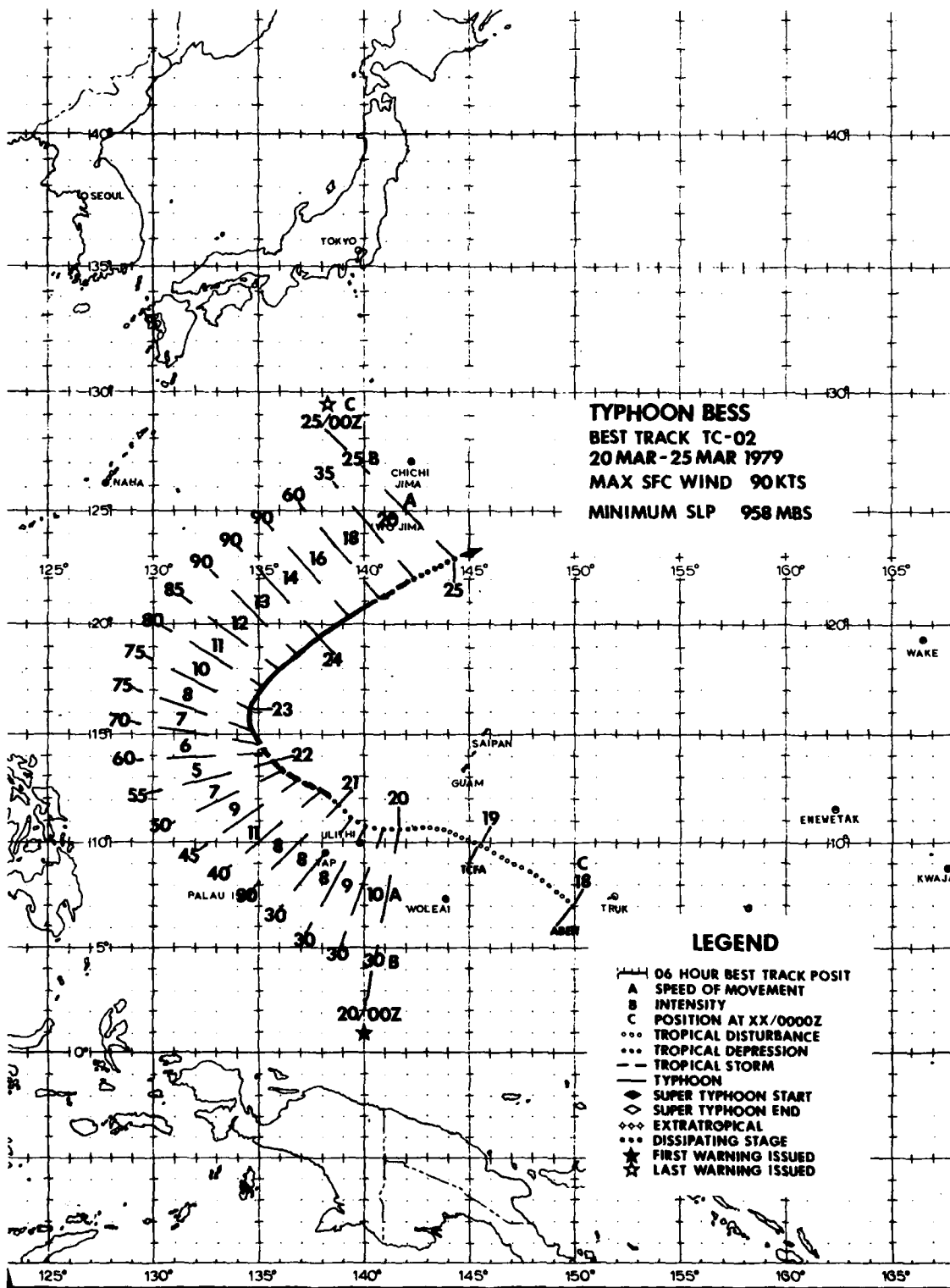


FIGURE 3-01-1. Typhoon Alice merging with the trailing end of a frontal shear-line, 9 January 1979, 0054Z. (DMSP imagery)



# TYPHOON BESS (02)

Since 1959, only three typhoons have developed over the Western Pacific in March. Of these three, only Bess developed in the last decade with Typhoon Tess developing in 1961 and Typhoon Sally in 1967. Tropical cyclone development in March is usually inhibited by a southward adjustment in the subtropical ridge axis. Although not recognized in advance, Typhoon Bess' development paralleled Typhoon Tess, which developed in the eastern Caroline Islands and reached tropical depression strength near Woleai Atoll. Continuing northwestward between Guam and Yap, both recurved northward near 135E (Fig. 3-02-1) before dissipating north of 20N under the influence of a strong vertical shear.



FIGURE 3-02-1. Typhoon Bess tracking northwestward between Guam and Yap at 8 kt (15 km/hr), 21 March 1979, 0103Z. Satellite imagery captured increased organization in the convective banding just prior to Bess reaching tropical storm intensity. (DMSP imagery)

Synoptic data at 160000Z suggested the existence of a weak surface circulation near 3.0N 152.5E at the base of a wave in the easterly flow. Satellite imagery at 160119Z indicated that an ill-defined area of convection existed near the surface circulation. By 161109Z, however, increased upper-level organization suggested development of a weak 200 mb anticyclone (Fig. 3-02-2). Increased curvature in the mid-level convective cloud pattern hinted at the possibility of tropical cyclone formation. As often observed in weak

developing systems, 162207Z satellite imagery showed a significant decrease in the mid- to upper-level convective organization, while the synoptic analysis continued to support a weak circulation southeast of Guam. Continuing to pulsate, the suspect area presented a curious, but intensified upper-level convective pattern on 172151Z and 172333Z satellite imagery. Synoptic analysis at 180000Z indicated that, in addition to the circulation near 3.5N 147.5E, a secondary low had developed on the slow moving wave axis near 7.1N 150.0E and that the earlier ill-defined convection had been associated with these two circulations. As this secondary low tracked northward up the wave axis, increased cyclon-



FIGURE 3-02-2. Infrared imagery of very early development stage of Bess, 16 March 1979, 1109Z. Streamline pattern indicates an upper-level anticyclone. A surface circulation had not yet developed. (DMSP imagery)

ic shear between strong easterly flow north of the wave and weak equatorial westerlies south of the wave caused the northern circulation to become the dominant center as the initial low weakened. Simultaneously, the upper-level anticyclone intensified, producing an excellent outflow signature on 182315Z satellite imagery (Fig. 3-02-3). Although a formation alert was issued based on 182315Z satellite imagery, continued rapid development did not occur as expected. Aircraft data at 200259Z found strong enhanced easterly flow of 20-30 kt (10-15 m/sec) to the northeast, but only weak cyclonic flow to the south and east. Aircraft reports finally confirmed tropical storm strength early on the 21st (Fig. 3-02-4), five days after Bess was initially observed.

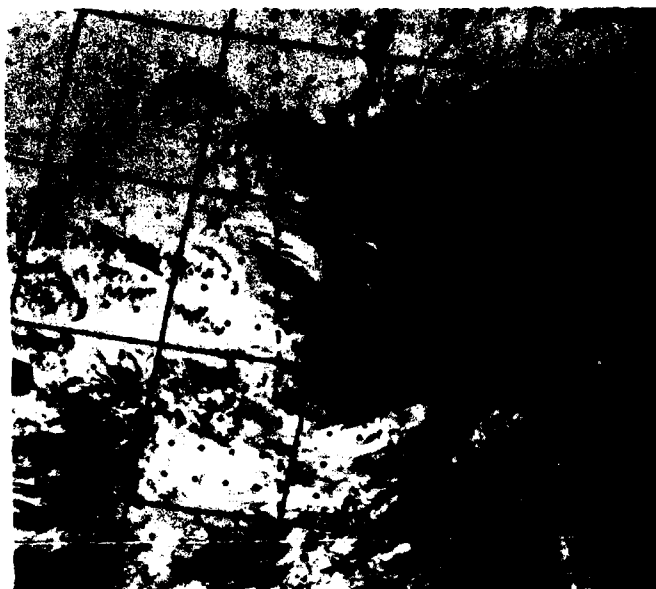


FIGURE 3-02-3. Infrared imagery of Typhoon Bess developing under good upper-level outflow which is visible from the southeast through the northwest, 18 March 1979, 2315Z. (DMSP imagery)

Sea Surface Temperature (SST) plays a vital role in the development and maintenance of tropical cyclones. A study by Charles P. Guard (1979) indicates that tropical cyclones which move over water cooler than 26C are less likely to intensify due to a reduction in latent heat. The study further states that tropical cyclones which develop prior to June intensify up to 10 kt (5 m/sec) after recurvature. This intensification, if experienced, will occur within the 12-24 hour period following recurvature. Typhoon Bess followed this recurvature pattern. The axis of recurvature was crossed at 230000Z. Slow intensification occurred over the next 18 hours with Bess reaching her maximum intensity of 90 kt (46 m/sec) at 231800Z. Bess maintained 90 kt (46 m/sec) for 18 hours and then rapidly weakened, dissipating by 250000Z. SST analyses during 24-27 March (Fig. 3-02-5) indicate that the area in which Bess weakened from 90-60 kt (46-31 m/sec) in a six-hour period corresponds closely to the location of water cooler than 26C. The reduction of latent heat input, coupled with increased vertical shear produced by strong westerlies aloft, literally sheared Bess apart during the final 12-18 hours.



FIGURE 3-02-4. Typhoon Bess just prior to reaching her maximum intensity of 90 kt (46 m/sec), 23 March 1979, 0235Z. Bess displays a large elliptical eye with strong radial cirrus outflow in all directions. (DMSP imagery)

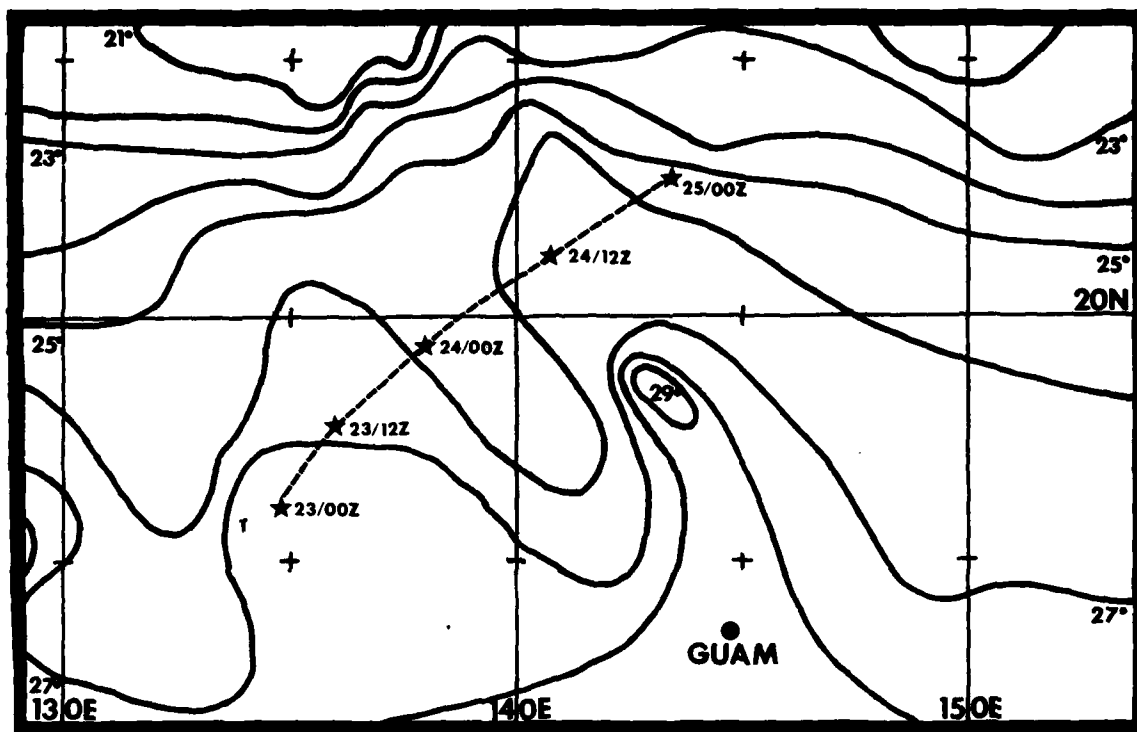
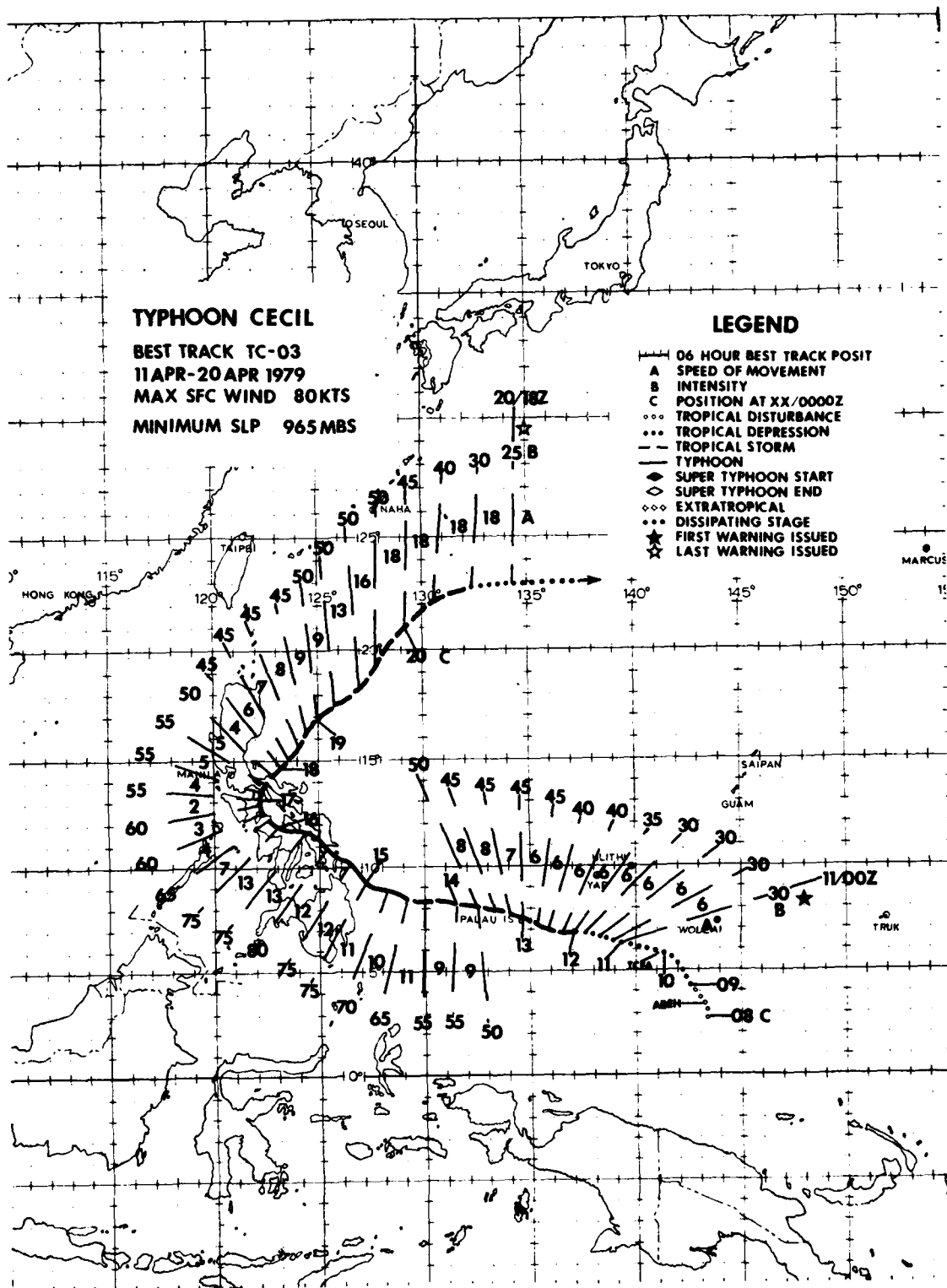


FIGURE 3-02-5. Composite of sea surface temperature analyses from 24-27 March 1979. Northeastward track of Typhoon Bess during dissipation stage is indicated by a dashed line with 12-hour positions.



# TYPHOON CECIL (03)

Typhoon Cecil, the first tropical cyclone of 1979 in the Northwest Pacific given a male name, generated in mid-April from an easterly wave over the Philippine Sea. Cecil was forecast very well while on a climatological west-northwest track toward the central Philippines. Overall, post-analysis statistics showed that mean forecast errors were better than long-term averages. Nevertheless, JTWC warnings failed to forecast the crucial recurvature point in Cecil's track. Was there sufficient evidence to forecast this recurvature 24-48 hours in advance?

Post-analysis showed that recurvature occurred 36 hours after the 151200Z best track position. Satellite imagery (Fig. 3-03-1) located Cecil just south of Samar. At this time, the 500 mb subtropical ridge axis was at 17N with a small high pressure cell located over Northern Luzon. The 500 mb 36-hour PE prog maintained the ridge. Steering techniques based on this synoptic situation indicated westward movement for 72 hours. Analog techniques indicated west-northwestward movement. As a matter of fact, no objective forecast technique indicated recurvature prior to entrance into the South China Sea. The climatological average location of the 500 mb ridge axis is along 15N for April over the Philippines and the climatological recurvature point is 15-17N. Both

synoptic and climatological data indicated a west-northwestward track over the Philippines with recurvature late in the forecast period in the South China Sea as Cecil tracked to the vicinity of 15N. Post-analysis, however, revealed that the ridge axis east of the Philippines abruptly shifted south between 161200Z and 170000Z with westerly winds intruding far to the south over the South China Sea. This pattern shift caused Cecil to recurve much earlier than anticipated. Within 48 hours, Cecil was well east of Luzon (Fig. 3-03-2). The ridge axis shift was the vital piece of information not present in any of the available prognostic tools. Thus, it appears even in post-analysis that forecasting of Cecil's recurvature 36 hours in advance was beyond state-of-the-art capabilities.

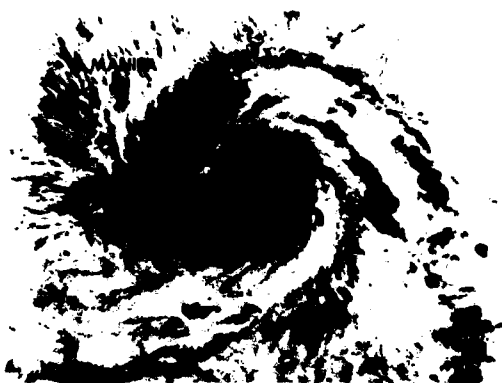


Figure 3-03-1. Infrared imagery of Typhoon Cecil 36 hours prior to recurvature with maximum sustained winds of 80 kt (41 m/sec), 15 April 1979, 1225Z. (DMSP imagery)

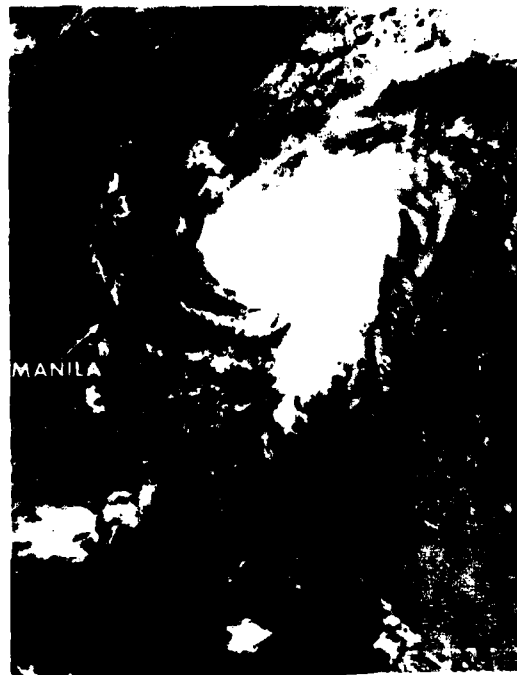
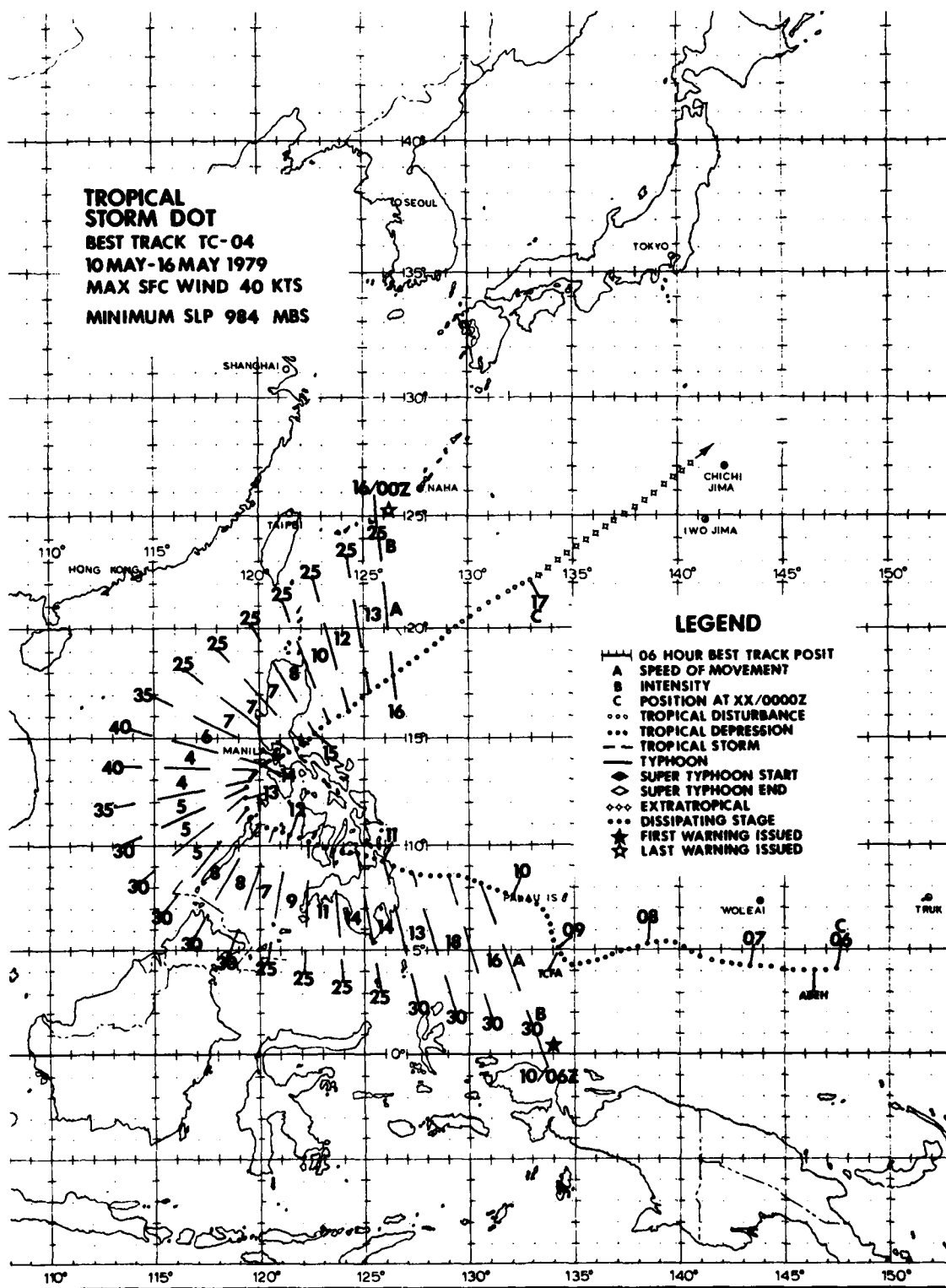


FIGURE 3-03-2. Cecil after recurvature with maximum sustained winds of 50 kt (26 m/sec), 19 April 1979, 0014Z. (DMSP imagery)



TROPICAL STORM DOT (04)

Tropical Storm Dot did not reach tropical storm strength prior to landfall on the Philippine Islands (Fig. 3-04-1). Once Dot crossed the islands, tropical storm strength was attained lasting, however, less than 24 hours (Fig. 3-04-2). Dot's development was cut short by the eventual frictional effects of Luzon and increasing vertical wind shear aloft.

TS Dot slowly formed in an area of broad, low-level easterlies, high surface pressures, and strong upper-level shear. The conditions for significant tropical cyclone development were poor while the system existed east of the Philippine Islands. After crossing the Philippines, however, Dot reached tropical storm strength while over the South China Sea.

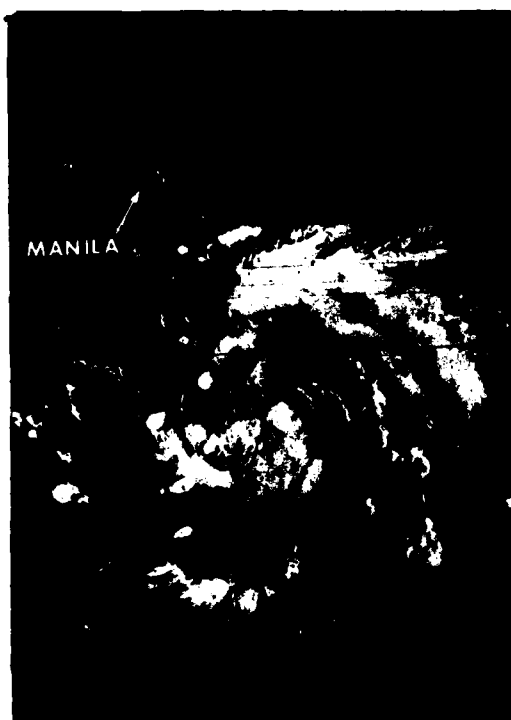
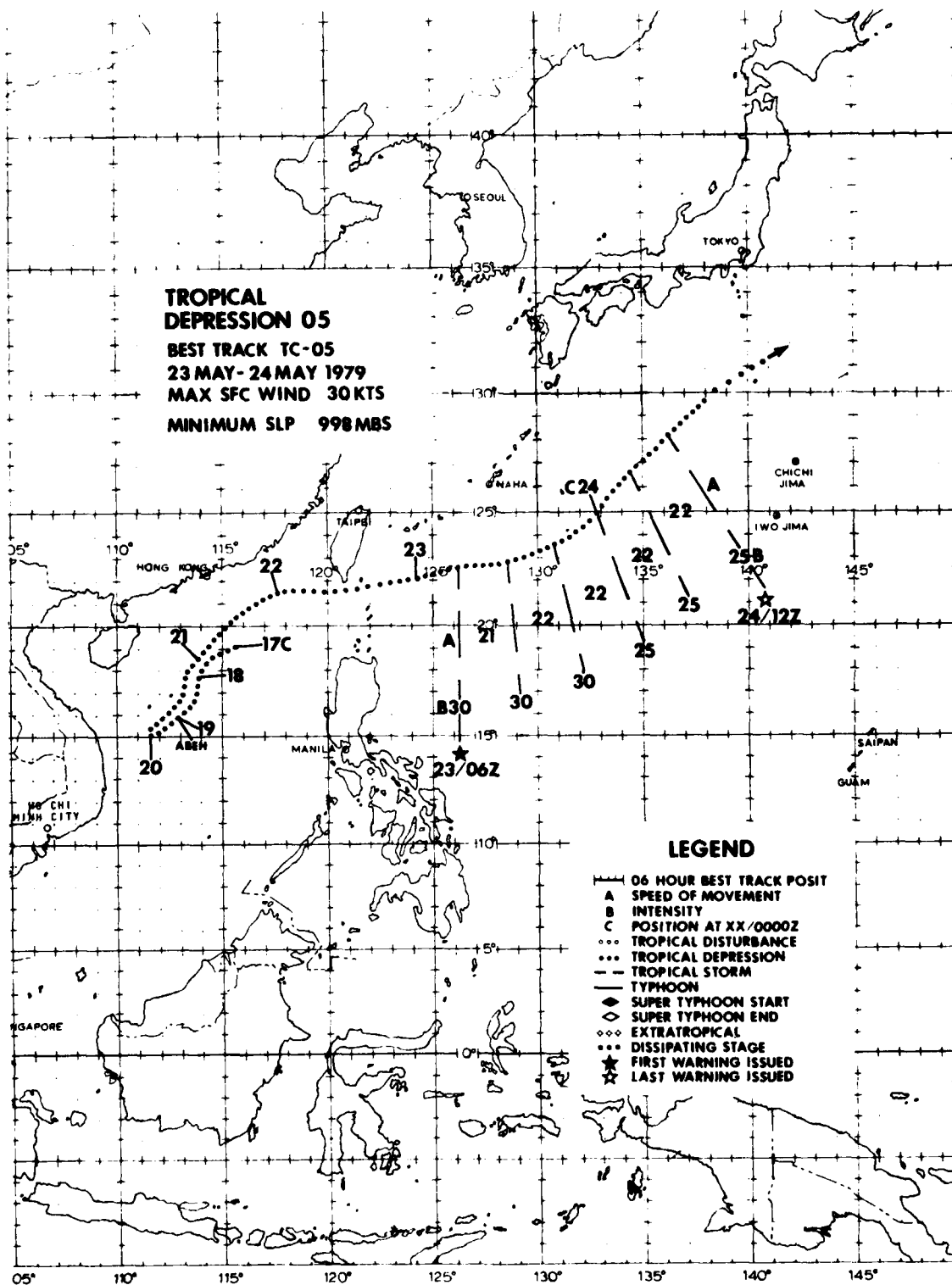


FIGURE 3-04-1. Tropical Storm Dot at 30 kt (15 m/sec) intensity while over northern Mindanao, 11 May 1979, 0029Z. (DMSP imagery)



FIGURE 3-04-2. Tropical Storm Dot while recurving toward Manila, 12 May 1979, 2353Z. (DMSP imagery)



# MONSOON/TROPICAL DEPRESSION (05)

Early season disturbances in the South China Sea, as discussed by Ramage (1971), may develop as a result of active monsoon troughs which extend eastward across Southeast Asia into the South China Sea (SCS). During late May, increased convergence in the enhanced southwest monsoon flow produced a significant increase in convection across the SCS, and several weak surface circulations were noted along the monsoon trough between Hainan Island and northern Luzon. Surface/gradient level synoptic analysis at 170000Z confirmed the existence of an elongated pressure trough with several 1005 mb centers. The main circulation, located northeast of the Paracel Islands, was actually north of the main convective area which covered most of the SCS south of the trough. Characteristics of SCS monsoon depressions include: strong enhanced southwesterly flow with light winds near the depression center; large areas of convection associated with convergence in the southwesterly flow with little curvature in towards the center; a relatively flat surface pressure regime of large areal extent; and, a mid-tropospheric cyclonic circulation over the area (Ramage, 1971). These conditions were observed in this area.

Initially, TD 05 drifted southwestward east of the Paracel Islands. By 200000Z a slow, eastward-tracking 500 mb short-wave over central China caused TD 05 to accelerate northeastward. As TD 05 accelerated, increased cyclonic shear at the surface southeast of Taiwan caused the system to transition from a monsoon depression to a tropical depression with a small anticyclonic outflow center evident aloft. (Many SCS monsoon depressions never make this transition, usually dissipating after 3-4 days.) Totally divorced from the monsoon trough, TD 05 tracked eastward through the Bashi Channel and then along the remnants of a weak frontal boundary. TD 05 was not forecast to intensify significantly, but it merged with an extratropical frontal boundary near 22.0N 124.8E and produced an improved satellite signature at 230018Z (Fig. 3-05-1) which included a banding-type eye. (Banding-type eyes are usually characteristic of more intense tropical cyclones.) Synoptic analyses during the life of TD 05 never indicated an intensity above 30 kt (15 m/sec). The lowest pressure recorded was 998 mb measured by a ship close to the circulation center. This pressure equates to approximately 32 kt (17 m/sec) (Atkinson and Holliday, 1975).

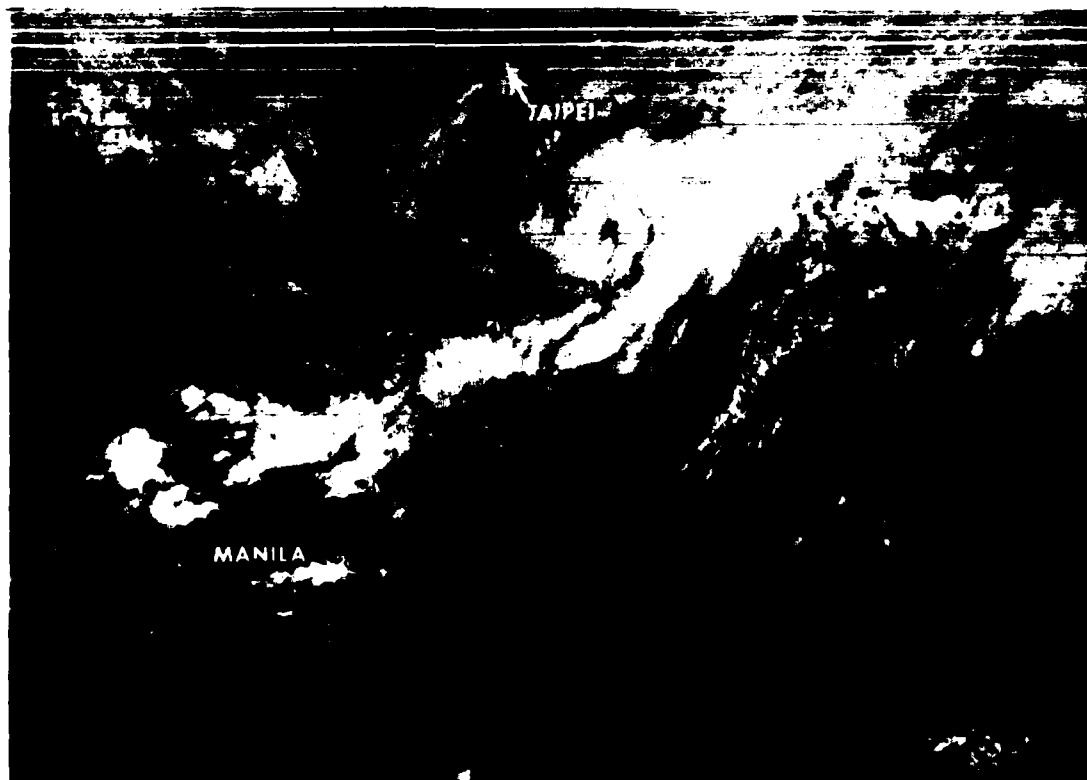
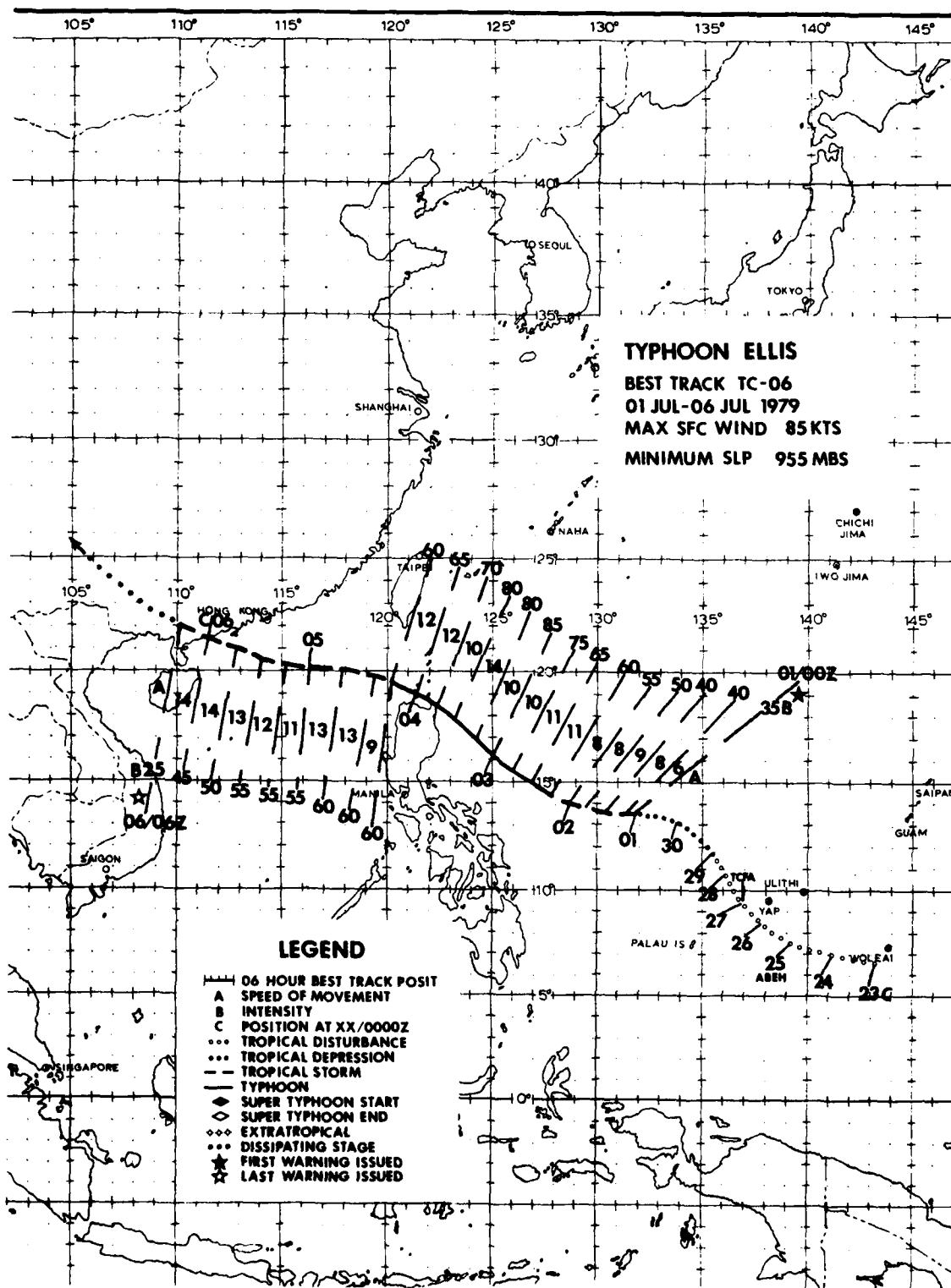


FIGURE 3-05-1. TD 05 at 30 kt (15 m/sec) intensity with banding-type eye moving east-northeastward at 20 kt (37 km/hr), 23 May 1979, 0018Z. (DMSP imagery)



# TYPHOON ELLIS (06)

The tropical disturbance, which later became Typhoon Ellis, was first noted on satellite and synoptic data on 25 June 1979. The surface/gradient-level analysis showed that a broad monsoon trough had developed between Guam and the Philippine Islands. At upper-levels, a Tropical Upper Tropospheric Trough (TUTT) was oriented northeast-southwest between the Volcano Islands and the central Philippine Islands. This TUTT allowed excellent upper-level outflow to the northeast and was expected to induce intensification of the tropical disturbance southeast of the TUTT axis. Therefore, a Tropical Cyclone Formation Alert (TCFA) was issued for the area valid at 270000Z. However, significant development did not occur. Reconnaissance aircraft could find only a very broad surface circulation with relatively high surface pressures. The surface circulation drifted under the TUTT and the associated convection was suppressed; development was thereby thwarted. Based on the superposition of the TUTT and the surface circulation and the fact that the overall satellite signature had not improved, the TCFA was cancelled at 282000Z.

The area was closely monitored, and when satellite imagery showed increased convective development and surface data showed decreasing pressures and increasing winds, a second TCFA was issued valid at 300600Z. Subsequent aircraft investigation revealed a minimum sea-level pressure of 1000 mb and surface winds in excess of 35 kt (18 m/sec). Based on this new information, the first warning on TS Ellis was issued at 010000Z July. Ellis was in a favorable position at that time and steady intensification occurred over the next 2 days.

For his entire lifetime, Ellis followed an uncomplicated, classic west-northwest track at near climatological speeds ranging from 9-14 kt (17-26 km/hr). Post-analysis indicates that Ellis was moving under the influence of the east-southeasterly steering flow on the southern edge of the subtropical mid-tropospheric ridge. Ellis' nearly straight track is due primarily to the fact that this ridge did not change in intensity or orientation during the period.

Ellis reached typhoon strength at 021200Z and a maximum intensity of 85 kt (44 m/sec) at 030000Z (Fig. 3-06-1). Continued intensification was anticipated, but a slow weakening trend was actually observed. As with Tropical Storm Faye, this weakening was associated with a drastic change in the upper-level flow pattern.

During Ellis' developing stage, the TUTT was located to the north-northwest and was providing the necessary outflow channel to the northeast. By 020000Z, however, an upper-level anticyclone over central China began to ridge eastward, forcing the TUTT to the northeast. Strong upper-level northeasterly winds associated with this anticyclone began to exert pressure on Ellis, shearing the convective activity to the southwest. Continuing west-northwest in this shearing environment, Ellis weakened steadily. By the time he was in the South China Sea, Ellis had weakened to tropical storm strength and was a completely exposed low-level circulation (Fig. 3-06-2).

With winds of 54 kt (26 m/sec), Ellis made landfall on the Chinese coast at 060000Z, 164 nm (296 km) southwest of Hong Kong and dissipated rapidly over land thereafter.

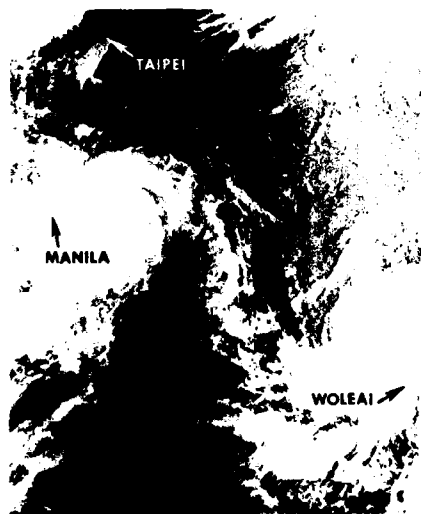


FIGURE 3-06-1. Typhoon Ellis (left) at maximum intensity of 85 kt (44 m/sec), 2 July 1979, 2356Z. TS Faye (right) is developing north of Woleai. (DMSP imagery)

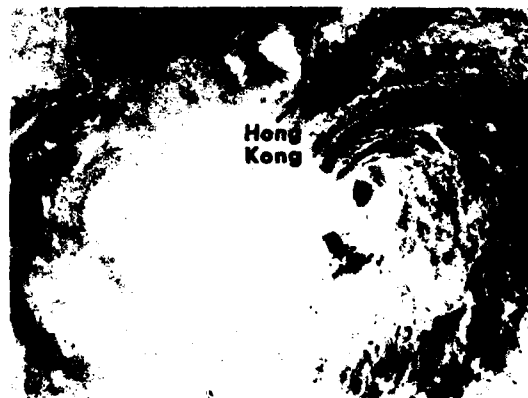
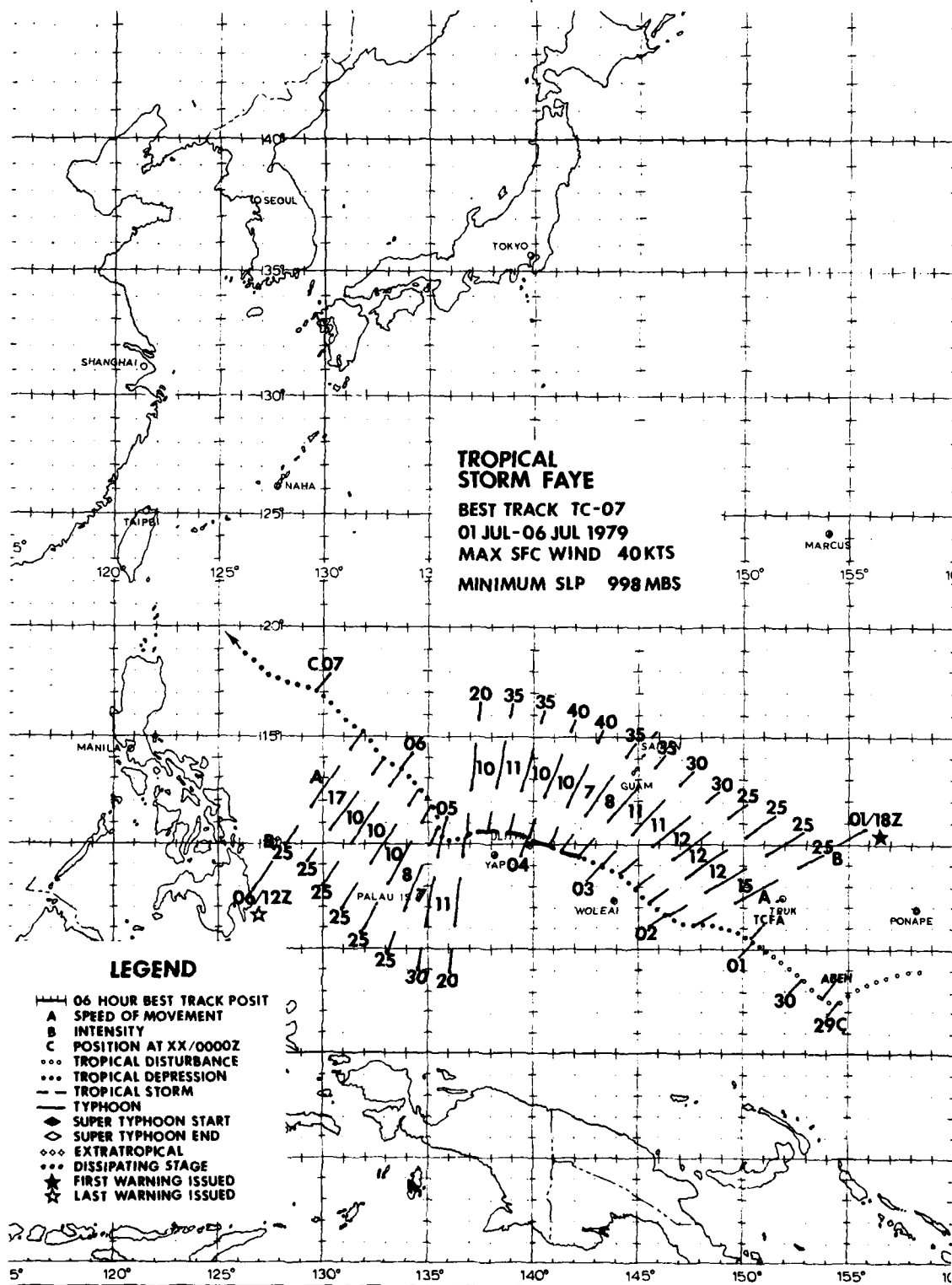


FIGURE 3-06-2. Tropical Storm Ellis as an exposed low-level circulation in the South China Sea, 5 July 1979, 0101Z. (DMSP imagery from Det 5, 14W, Clark AB, RP)



# TROPICAL STORM FAYE (07)

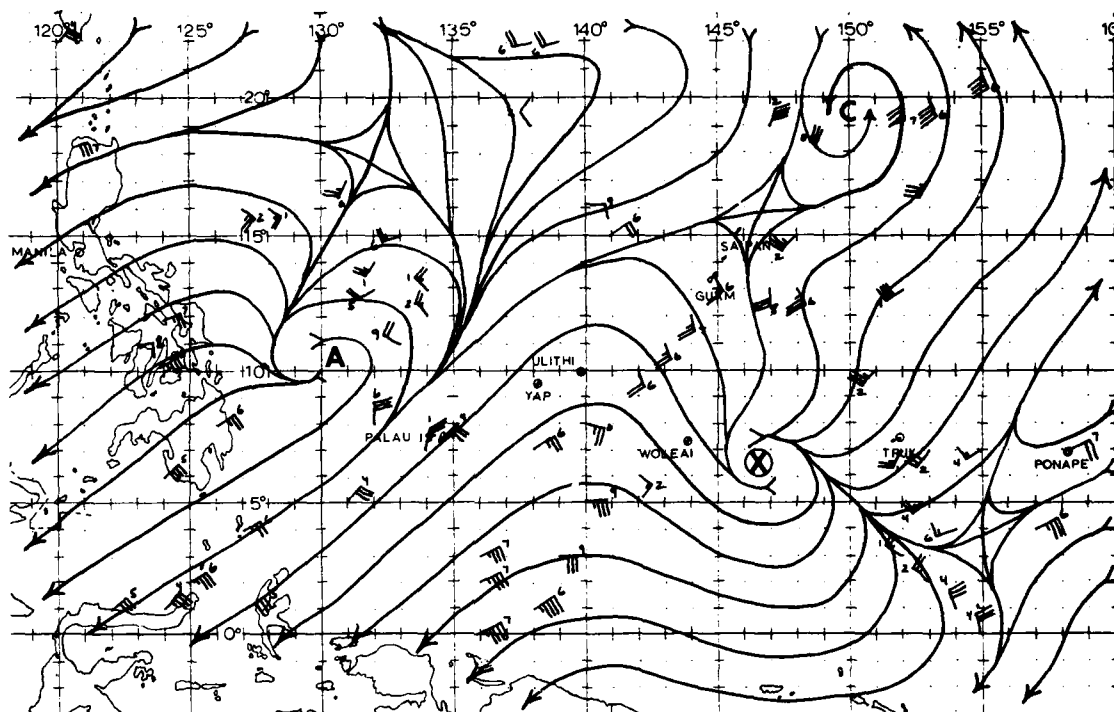


FIGURE 3-07-1. Upper-level streamline analysis at 020000Z July 1979.

Tropical Storm Faye proved a most interesting case study, not because it developed into an intense tropical cyclone, but because typhoon intensity was not attained as forecast.

TD 07 was first analyzed as a closed surface circulation about 800 nm (1482 km) southeast of Guam on the 28th of June. The associated convective activity remained disorganized until 011200Z July. At that time a TUTT cell developed north of the system; thereby providing an excellent upper-level outflow channel to the northeast (Fig. 3-07-1). The wind data plotted in figures 3-07-1, -3 and -5 are a combination of RAOBS, AIREPS and satellite-derived winds for the 250 mb to 150 mb levels.

Difffluence over TD 07 was extensive and well-defined. The satellite signature also showed improved outflow (Fig. 3-07-2), and further intensification was expected.

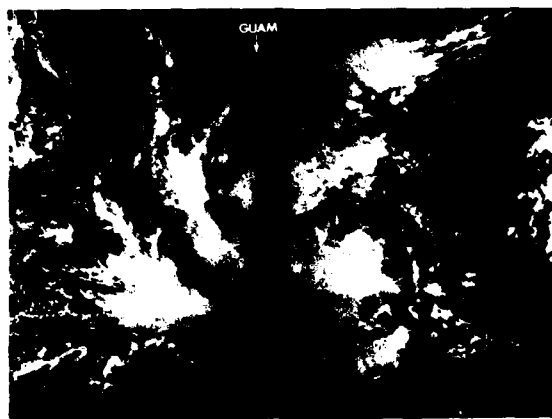


FIGURE 3-07-2. The tropical depression that was to become TS Faye, 02 July 1979, 0022Z. (DMSP imagery)

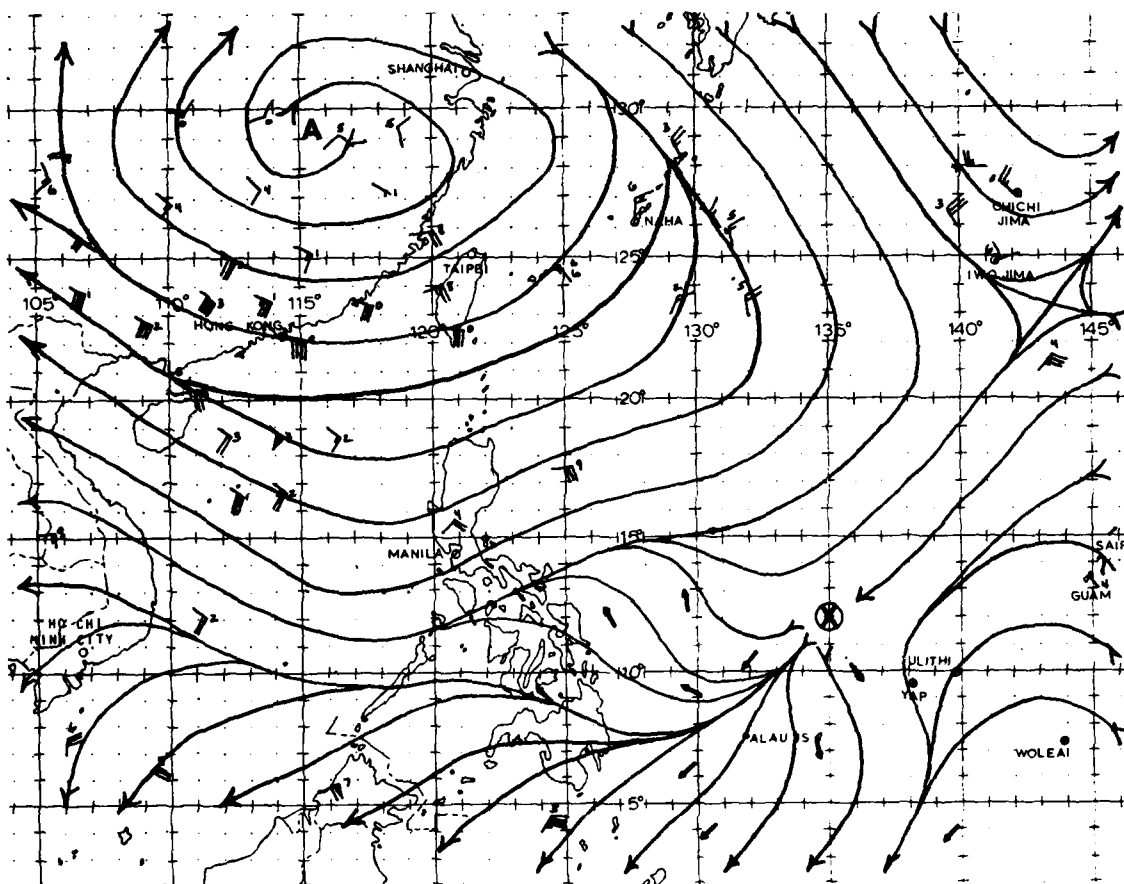


FIGURE 3-07-3. Upper-level streamline analysis at 051200Z July 1979.

The flow pattern over the depression (TD 07) remained favorable for development for the next two days and tropical storm intensity was reached by 031800Z. Continued intensification was still anticipated with typhoon strength forecast within 18 hours.

Instead of intensification, however, Faye weakened. Post-analysis shows that Faye's weakening, and subsequent dissipation, was linked to a radical change in the upper-level flow pattern. Whereas figure 3-07-1 shows a tropical cyclone in excellent position for intensification, figure 3-07-3 shows just the opposite. By 051200Z, a large upper-level anticyclone over China was beginning to build southeastward into the western Pacific toward Faye. Faye's outflow channel to the north became restricted and her low-level circulation center became exposed (Fig. 3-07-4). The mid- to upper-level centers and the associated convection were sheared off to the southwest by increased northeasterly winds at the upper-levels.

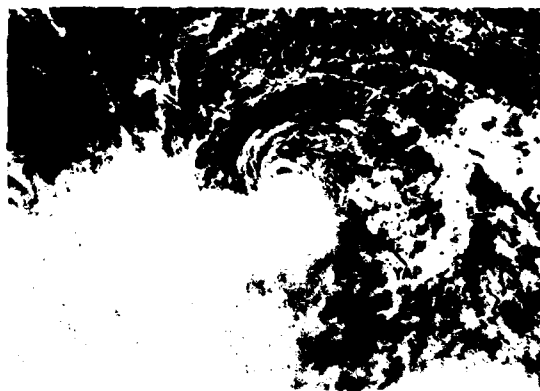


FIGURE 3-07-4. TD 07 (FAVE), 05 July 1979, 1202Z. Strong upper-level northeasterlies have begun to shear off the convection to the southwest. (DMSP Imagery, Moonlight Visual)

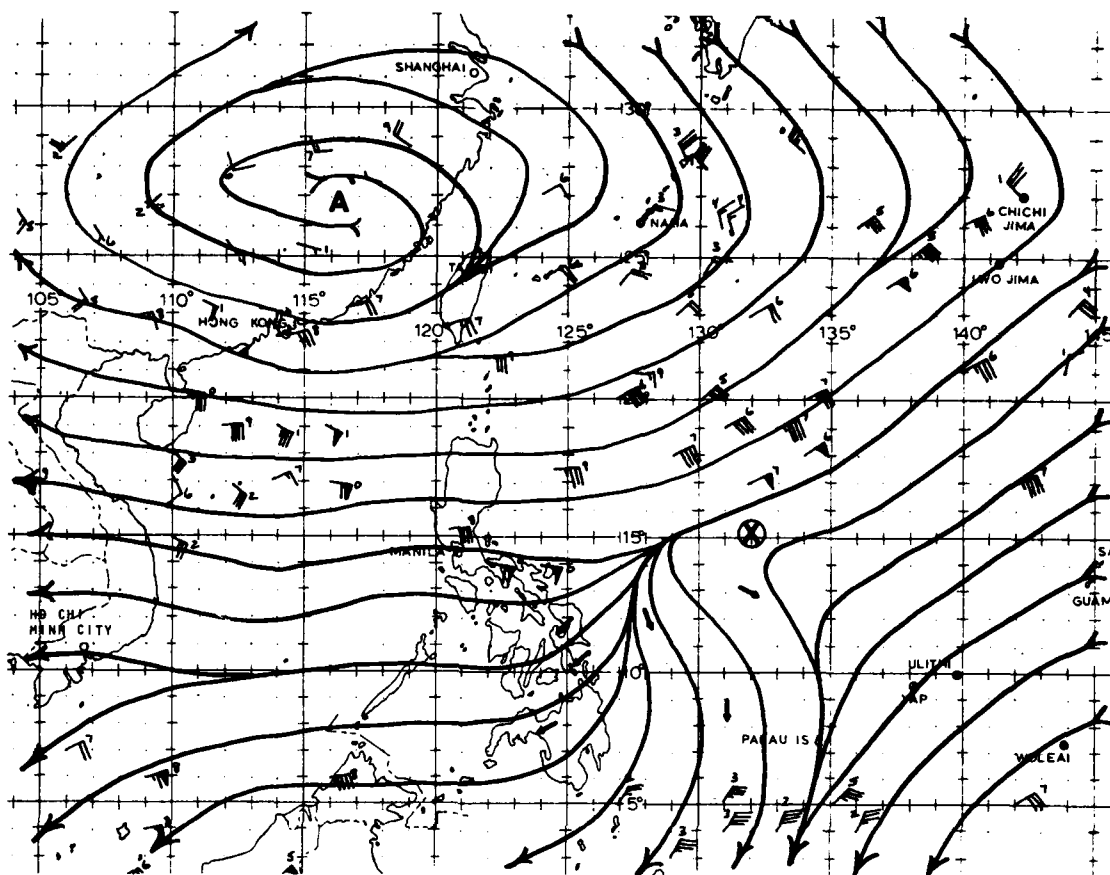


FIGURE 3-07-5. Upper-level streamline analysis at 061200Z July 1979.

Displacement between surface and upper-level centers was observed often during the 1979 season (e.g., see discussions on Hope, Irving, Ellis). Development is usually arrested in this situation, until the system becomes aligned in the vertical. In the case of TS Faye, the upper-level pattern failed to improve. Figure 3-07-5 shows that by 061200Z the upper-level ridge had intruded as far east as Guam and that northeast winds aloft had increased to 50 kt (26 m/sec). At that time, Faye's low-level circulation was fully exposed (Fig. 3-07-6).

This exposed low-level circulation meandered northwestward for two days and eventually dissipated northeast of Luzon.

The short history of Tropical Storm Faye is an excellent example of premature dissipation induced by strong vertical wind shear.

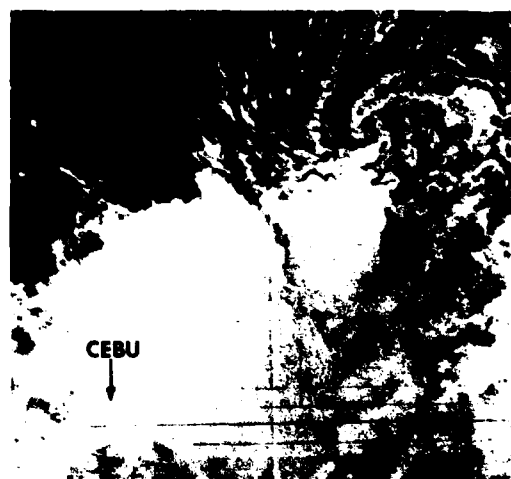
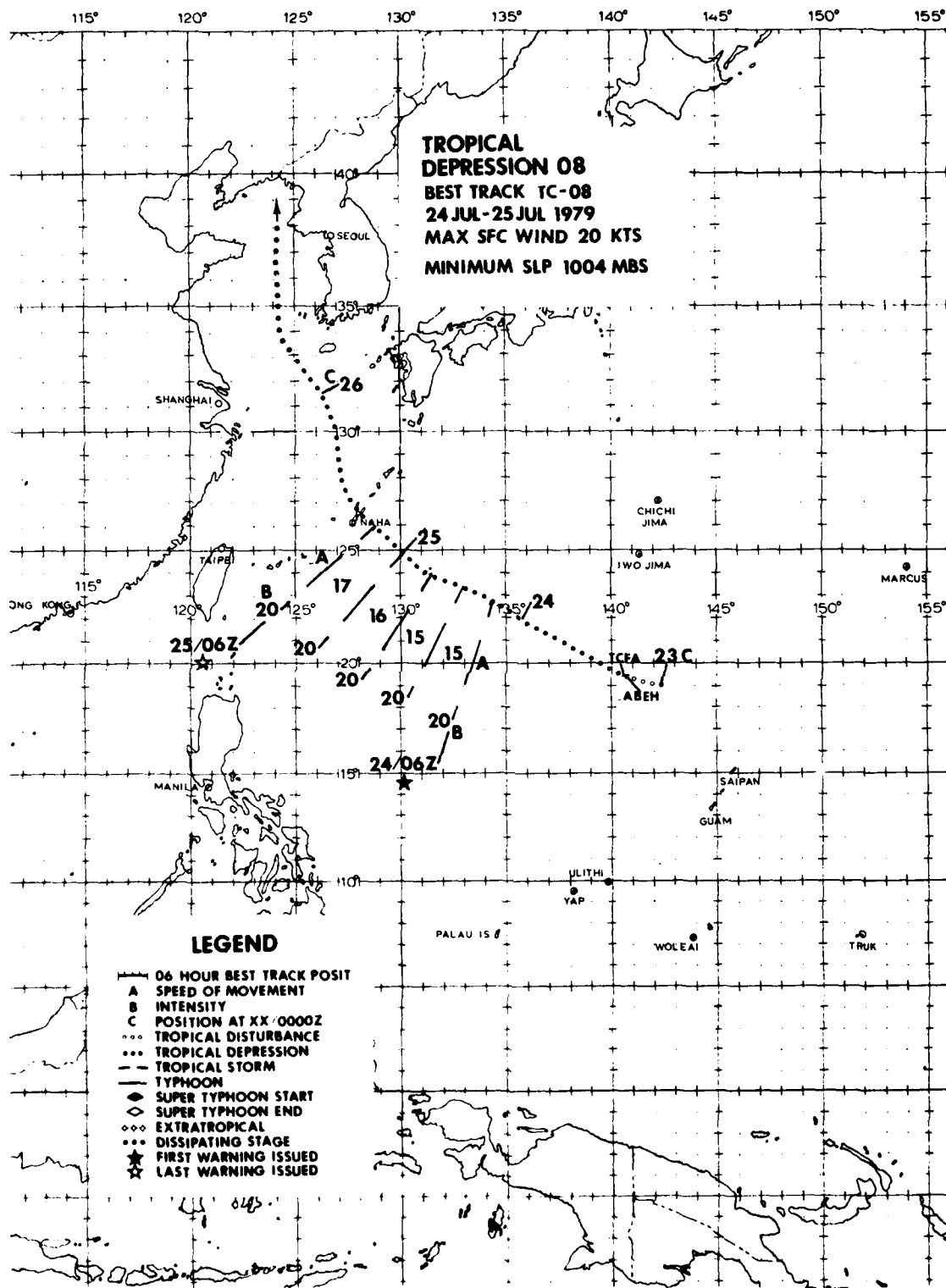


FIGURE 3-07-6. TD 07 (FAVE) is now a fully exposed low-level circulation, 06 July 1979, 1518Z. (DMSP imagery, Moonlight Visual)



# TROPICAL DEPRESSION 08

For the greater part of its life, TD 08 was an exposed low-level circulation with the major convective activity detached to the north of the surface center (Fig. 3-08-1). Aircraft reconnaissance confirmed an exposed surface circulation approximately 100 nm (185 km) south of the convective center at 241016Z.

TD 08 was not expected to intensify to

tropical storm strength as a result of strong vertical shear which began on 231200Z. However, initial warnings were issued based on the forecast track which indicated passage directly over Okinawa.

Post-analysis indicated that the calm-wind center did indeed track over Okinawa with most of the convective activity tracking well north of the island.

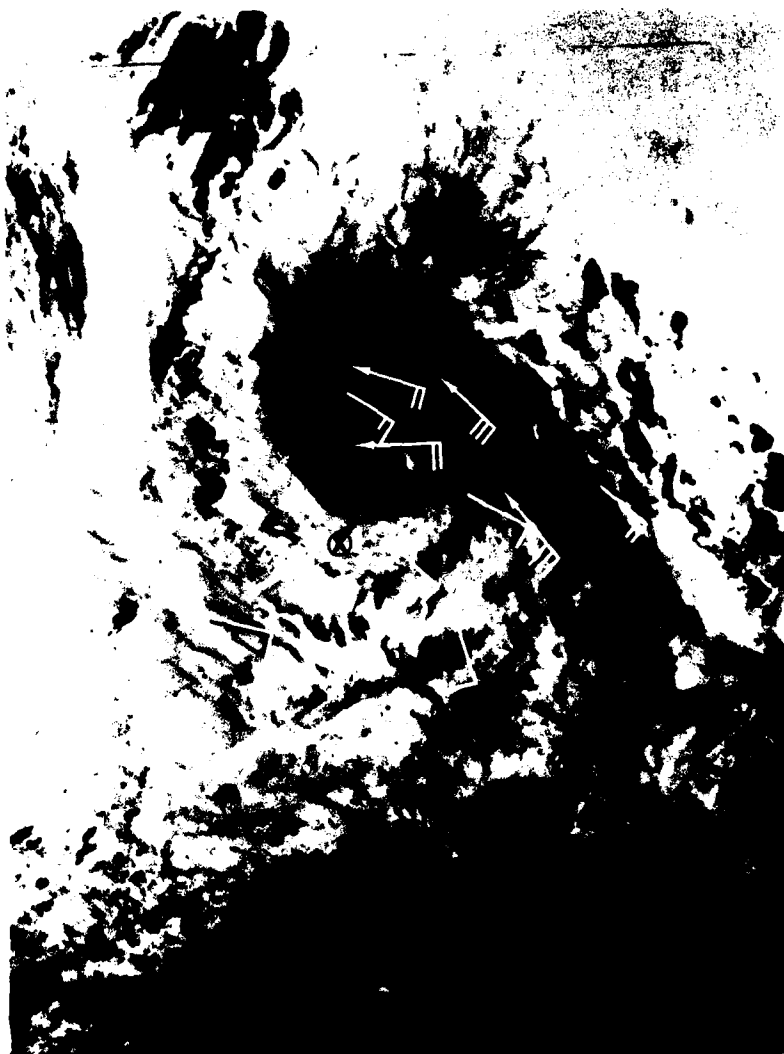
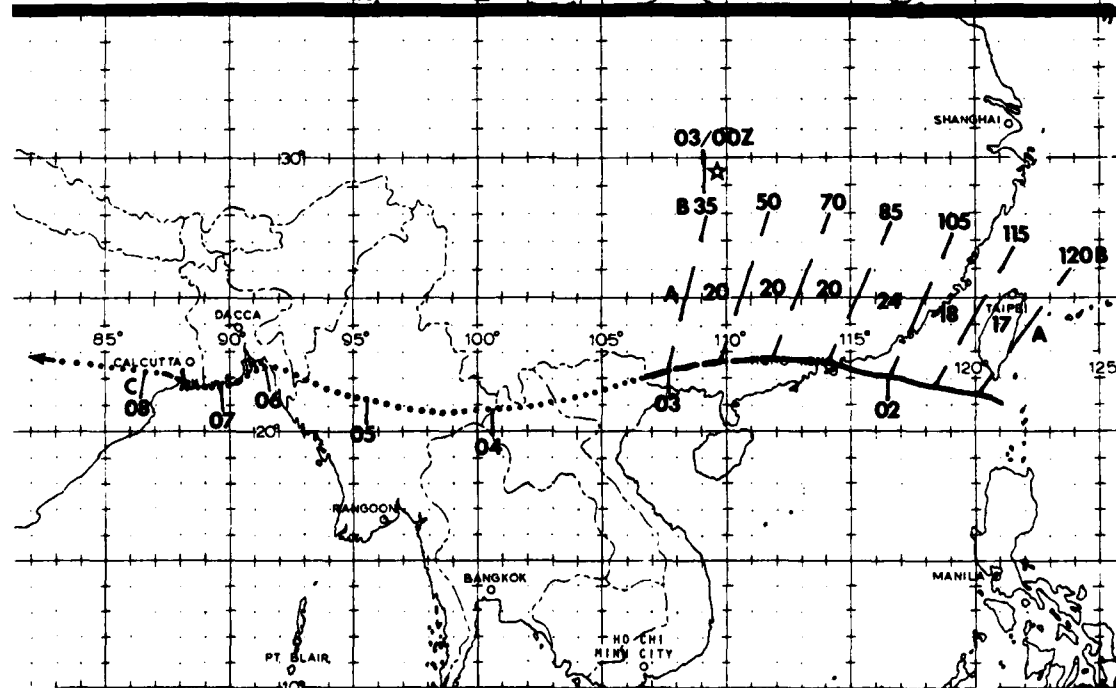
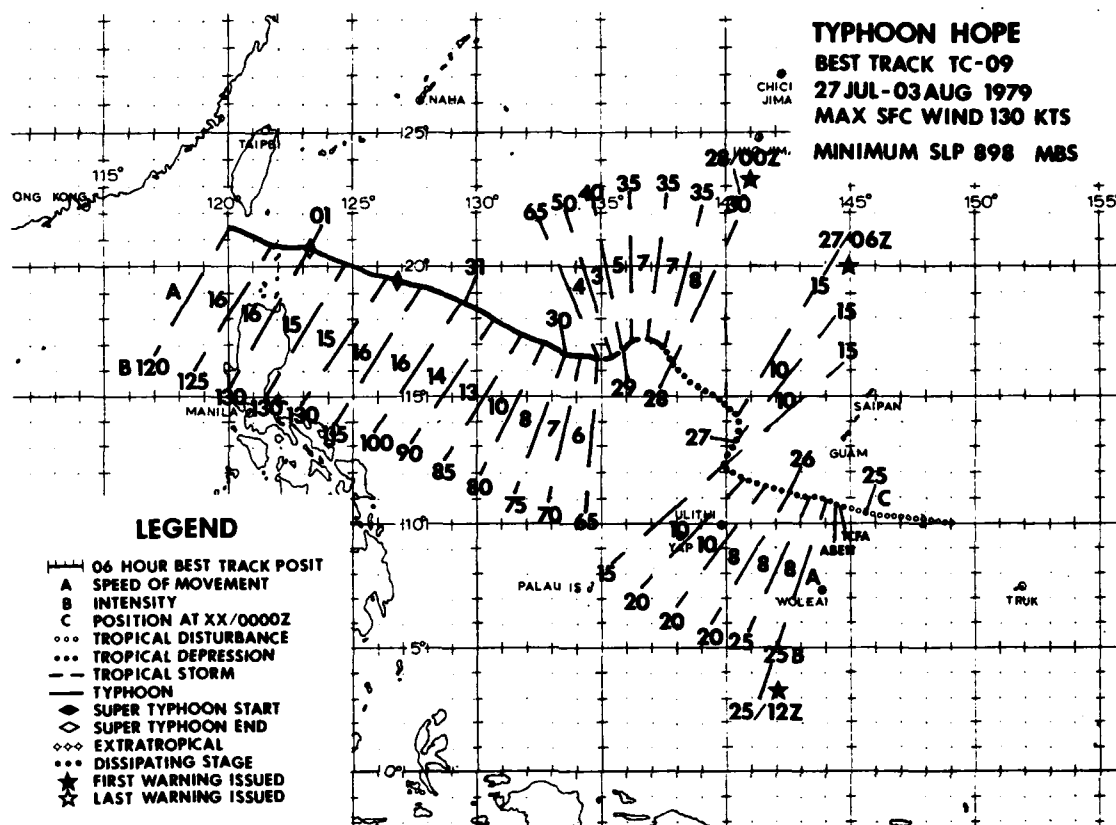


FIGURE 3-08-1. Infrared imagery of TD 08 at maximum intensity of 20 kt (37 m/sec), 24 July 1979, 1244Z. TD 08's 241200Z surface center (●) is depicted relative to surface ship reports (—) and 700 mb aircraft reports (←). (DNMSP imagery)



SUPER TYPHOON HOPE (09)

The disturbance which eventually developed into the first super typhoon of 1979 became evident on satellite imagery at 250000Z July as a focal point of cumulus banding. Future intensification was indicated as the disturbance was situated within an area of strong upper-level diffluence associated with the southern periphery of an east-west oriented TUTT. This outflow mechanism aloft, combined with an improved satellite signature, dictated issuance of a Tropical Cyclone Formation Alert at 250751Z; the alert box described an area southwest of Guam. Subsequent aircraft reconnaissance at 250900Z described a cyclonic circulation with wind speeds of 15-25 kt (8-10 m/sec) and a central pressure of 1004 mb centered near 11.1N 144.5E. Based on this aircraft data and the proximity to Guam, the first warning on TD 09 (Hope) was issued at 251200Z.

From the 25th through the 26th of July, while TD 09 (Hope) tracked to the west-northwest, the TUTT axis shifted northward and strong upper-level northeast flow dominated the area. The resultant shear produced by this uni-directional upper-level flow displaced the convective activity to the southwest of the surface circulation, indicating a loss of vertical alignment and subsequent weakening. By 270600Z, the center of the convective activity was displaced 120 nm (222 km) southwest of the low-level circulation center. Surface analyses, at this time, indicated the southwest monsoonal flow was being channeled principally into Tropical Storm Gordon located 750 nm (1389 km) to the northwest of TD 09 (Hope). With further weakening of Hope expected, a final warning was issued at 270451Z advising that the area would be closely monitored for possible

regeneration. Post-analysis showed that from 271200Z through 280000Z, the TUTT weakened with resultant reduced shear over TD 09 (Hope). Conditions for development being improved, reorganization took place and TD 09 began to develop. Unfortunately, the improvement in the surface circulation went unnoticed as it occurred during the night when only infrared satellite imagery, on which low-level clouds are difficult to distinguish, was available. An aircraft investigation on the morning of the 28th reported a surface pressure of 999 mb with 45-50 kt (23-27 m/sec) winds in the heavy convective activity to the southwest of the surface center. A warning was issued at 280221Z indicating the regeneration of TD 09 (Hope).

By 280000Z, Tropical Storm Gordon had moved into the Luzon Straits. Due to the orographic blocking of the Philippine land mass, the majority of the strong southwest monsoonal flow was diverted into Hope. This increased low-level inflow coupled with decreasing upper-level shear resulted in a much improved vertical structure with feederband activity developing in the south; 282052Z aircraft reconnaissance supported this improved organization trend. Post-analysis indicates that TD 09 (Hope) could have been upgraded to tropical storm intensity 12-24 hours prior to the warning upgrade at 290000Z, as 35-45 kt (18-23 m/sec) winds were reported in feederband activity as much as 24 hours earlier (Fig. 3-09-1). By 290920Z, a well-defined eye with a central surface pressure of 972 mb and 65-70 kt (33-36 m/sec) surface winds were reported by aircraft data; the 291200Z warning upgraded Hope to a typhoon.

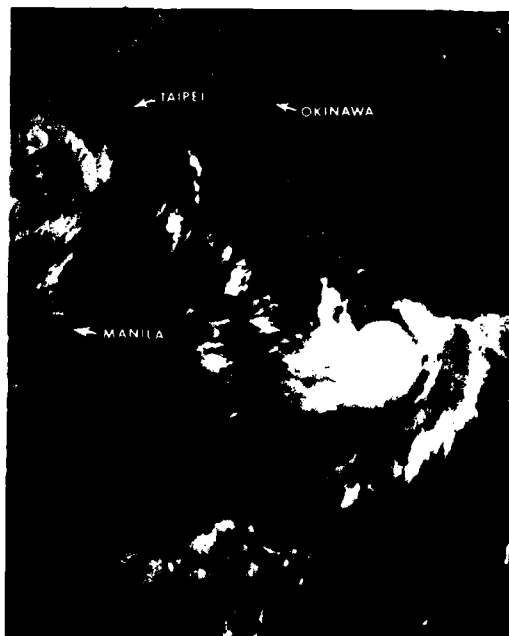


FIGURE 3-09-1. Hope (right) at tropical storm intensity 570 nm (1056 km) northeast of Guam, 29 July 1979, 0219Z. Tropical Storm Gordon (left) is 100 nm (185 km) east of Hong Kong. (DMSP imagery)

The 291200Z 200 mb analysis indicated the TUTT had again established itself north of Hope. Due to the east-west orientation of the TUTT, strong westerly flow along its southern periphery enhanced Hope's upper-level anticyclonic outflow. Aircraft reconnaissance at 292031Z indicated a sharp decrease in surface pressure to 961 mb with the temperature/dewpoint data correlating to an equivalent potential temperature ( $\theta_e$ ) of 359K. An empirically derived forecast aid that relates pressure and  $\theta_e$  indicates that once the traces intersect, rapid intensification can be expected within 18-30 hours (Fig. 3-09-2). The intensification equates to a possible mean pressure decrease of 44 mb and a mean wind speed increase of 50-60 kt (26-30 m/sec). Typhoon Hope verified this study 36 hours after the intersection occurred; reconnaissance aircraft reported a surface pressure of 898 mb and wind speeds of 100-120 kt (51-62 m/sec). By 311200Z, Hope attained super typhoon intensity of 130 kt (67 m/sec) (Fig. 3-09-3).



FIGURE 3-09-3. Infrared imagery of Hope just after attaining super typhoon intensity of 130 kt (67 m/sec), 31 July 1979, 1244Z. (DMSP imagery)

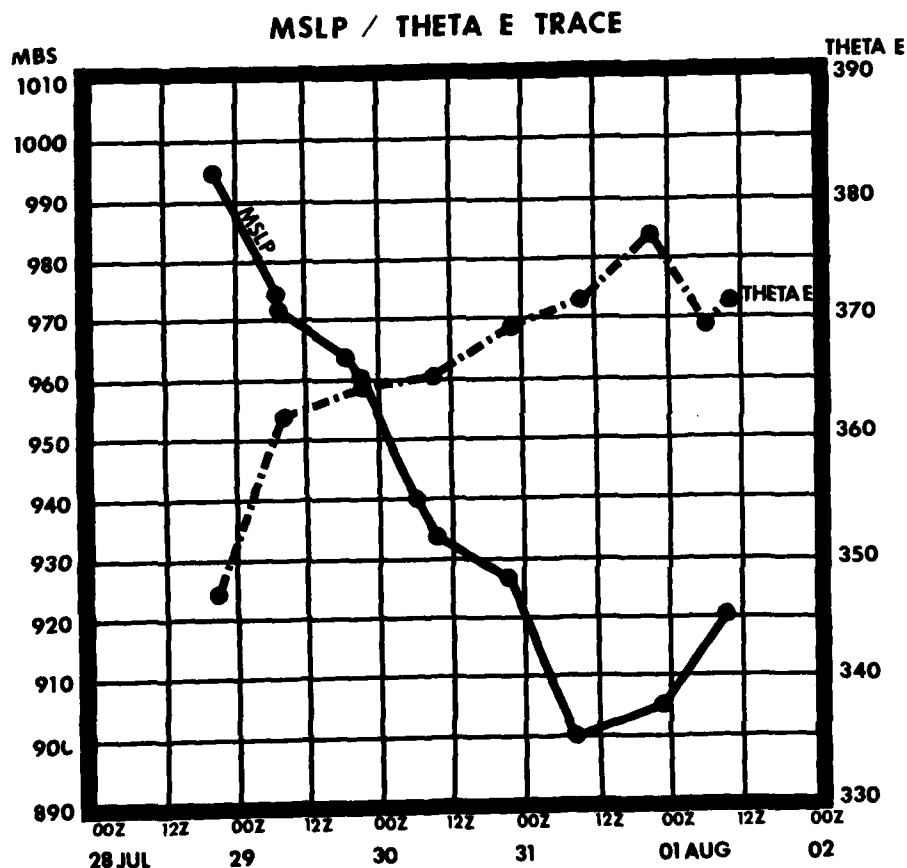


FIGURE 3-09-2. Time cross-section of Hope's minimum sea-level pressure versus equivalent potential temperature (THETA E [ $\theta_e$ ]) derived from aircraft reconnaissance.

Hope entered the Luzon Straits approximately 4 days after Tropical Storm Gordon. Hope's compact wind structure and a slight weakening trend were noted as Heng Chun (WMO 46752) on the southern tip of Taiwan reported sustained winds of 40 kt (21 m/sec) with gusts to 86 kt (44 m/sec) at 011000Z as Hope passed 45 nm (83 km) south of the station. Two persons on the Batanes Islands and one person on Taiwan were killed as a result of the torrential rainfall experienced as Hope tracked through the Luzon Straits.

Typhoon Hope made landfall less than 10 nm (19 km) north of Hong Kong at 020530Z (Fig. 3-09-4) with maximum sustained winds of 70 kt (36 m/sec) and gusts to 110 kt (57 m/sec) reported. Figure 3-09-5 is a time sequence of the surface observations received from the Royal Observatory of Hong Kong during Hope's passage. Extensive wind and rain damage, 3 deaths and over 258 injuries were reported. Damage to shipping within Hong Kong harbor was heavy as 17 ships broke their moorings and 8 ships collided.

Subsequent to passage over Hong Kong, Hope moved into southern China and weakened. The final warning was issued at 030111Z downgrading Hope to tropical storm intensity. Hope's uncomplicated northwest track after development into a typhoon resulted in minimal right-angle track errors with her unexpected acceleration accounting for the majority of the discrepancy.

Although weakening considerably during passage over southeast Asia, Hope did maintain a satellite signature and exited into the northern Bay of Bengal 110 nm (204 km) southeast of Dacca, Pakistan at 060500Z.

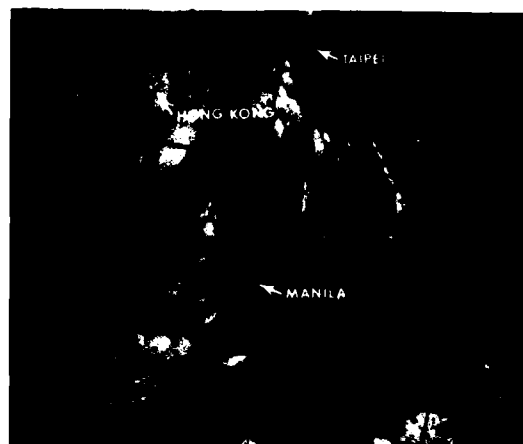


FIGURE 3-09-4. Typhoon Hope at 100 kt (51 m/sec) intensity, 3 hours prior to closest point of approach to Hong Kong, 2 August 1979, 0247Z. (DMSP imagery)

Strengthened once again by pre-existing strong southwest monsoonal flow, Hope reintensified from 070000Z through 071800Z with maximum sustained winds of 35 kt (18 m/sec) reported on 071200Z surface analysis. A tropical cyclone warning was not issued due to Hope's proximity to land and her expected movement into northeastern India within 12 hours. Hope, however, was discussed at length in the Significant Tropical Weather Advisory (ABEH PGTW).











45005 - HONG KONG OBSERVATORY				ST HOPE		DATE:02 JULY 1979 / TIMES:01-10Z			
02/01z	02/02z	02/03z	02/04z	02/05z	02/06z	02/07z	02/08z	02/09z	02/10z
 991	 989	 984	 978	 965	 960	 976 G57	 983	 988 G54	 992

FIGURE 3-09-5. Hourly surface synoptic observations from the Royal Observatory of Hong Kong (ROHK) during passage of Typhoon Hope.



# TROPICAL STORM GORDON (10)

Gordon, the 10th significant tropical cyclone of 1979, developed in late July in the monsoon trough near 20N-135E and eventually made landfall east-northeast of Hong Kong. A stronger sister, Hope (TD 09), followed Gordon several days later on a similar track into Hong Kong. Note that TD 09 (Hope) and TD 10 (Gordon) are alphabetically out of sequence because TD 10 was upgraded to tropical storm stage before TD 09.

Post-analysis revealed that Gordon reached tropical storm intensity at the time of the first warning. CINCPACINST 3140.1N, section 2.5.1., paragraph b states that warnings will be issued when "maximum sustained wind speeds are forecast to increase to 34 or more knots within 48 hours." In this case, there was no lead time between the first warning and tropical storm stage. Figures 3-10-1 and 3-10-2 illustrate why this occurred. TD 10 developed rapidly within the 22-hour time period between these figures. Synoptic data indicated increasing southwest monsoon flow into the area during this period; yet no definitive surface circulation could be located. The most significant finding of the post-analysis was that Gordon could not be traced back 48 hours prior to the first warning from available synoptic and satellite data, and, therefore, falls into the category of a rapid developing system.

Gordon's track took an unexpected jog northwestward while passing south of Taiwan (Fig. 3-10-3). (Typhoon Hope took a similar, but less pronounced, jog.) This northward adjustment is historically evident from tropical cyclones that pass south of Taiwan. The influence of Taiwan's high mountain range is thought to be responsible. As tropical cyclones pass south of Taiwan, they induce lee-side troughing west of the mountains over the Formosa Strait and track northwestward in response.



FIGURE 3-10-1. Tropical Storm Gordon in its infancy 4 hours prior to being discussed on the Significant Tropical Weather Advisory (ABEH PGTW), 25 July 1979, 0151Z. (DMSP imagery)

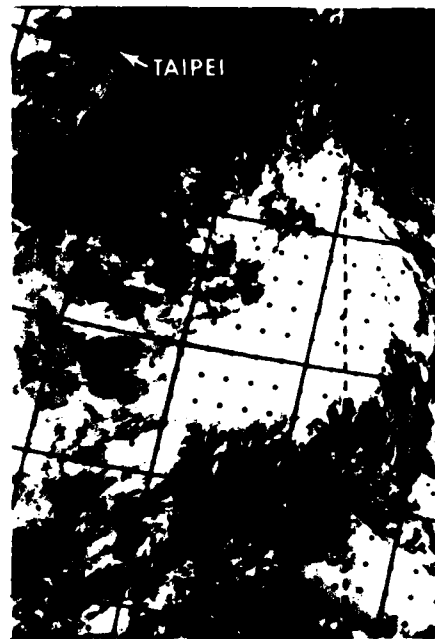
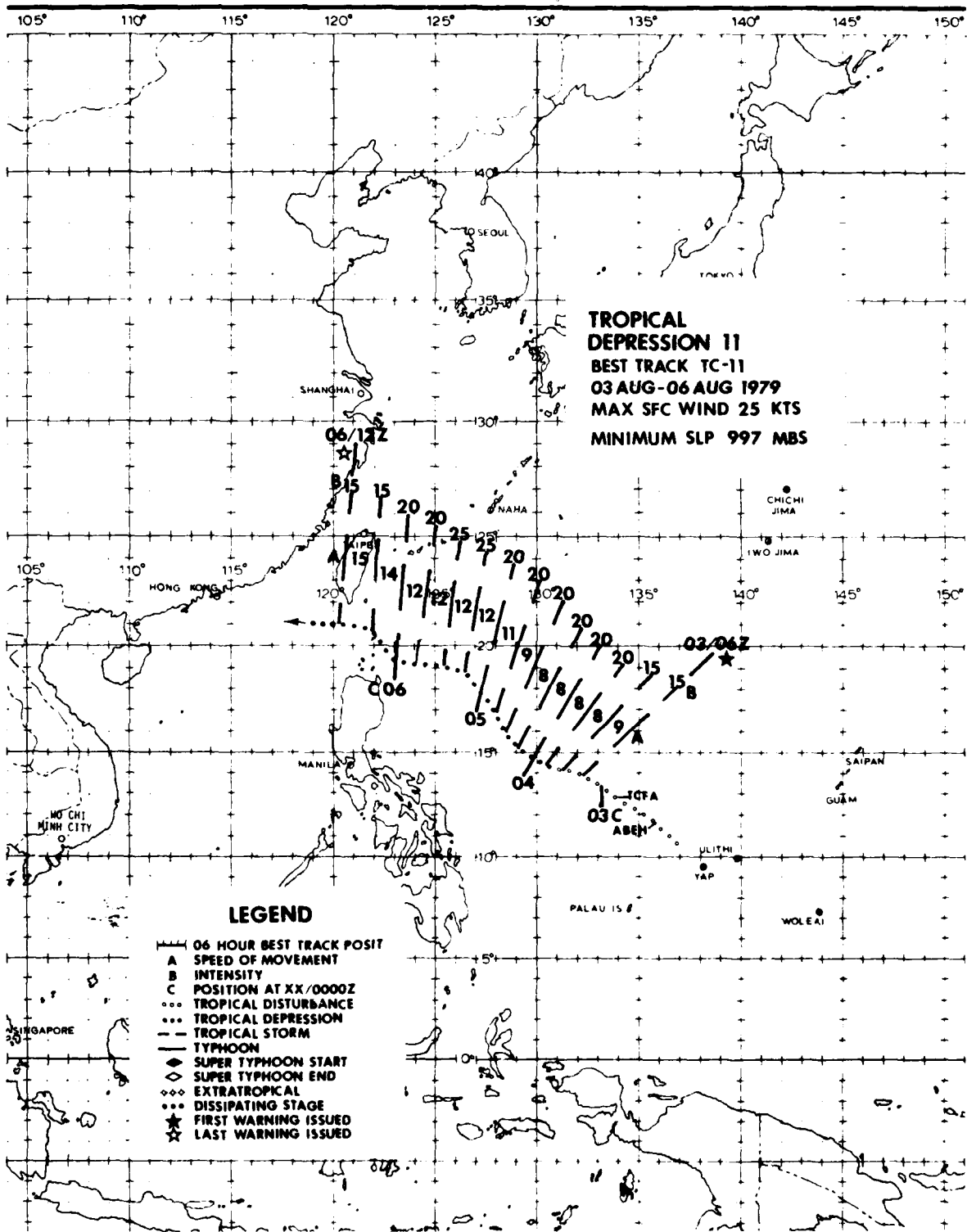


FIGURE 3-10-2. Tropical Storm Gordon 22 hours after Figure 3-10-1 showing increased development, 25 July 1979, 2350Z. A Tropical Cyclone Formation Alert was issued 6 hours prior to this time. (DMSP imagery)



FIGURE 3-10-3. Kaohsiung radar presentation of Gordon at 282103Z after passing south of Taiwan. (Photograph courtesy of the Central Weather Bureau, Taipei, Taiwan.)



TROPICAL DEPRESSION 11

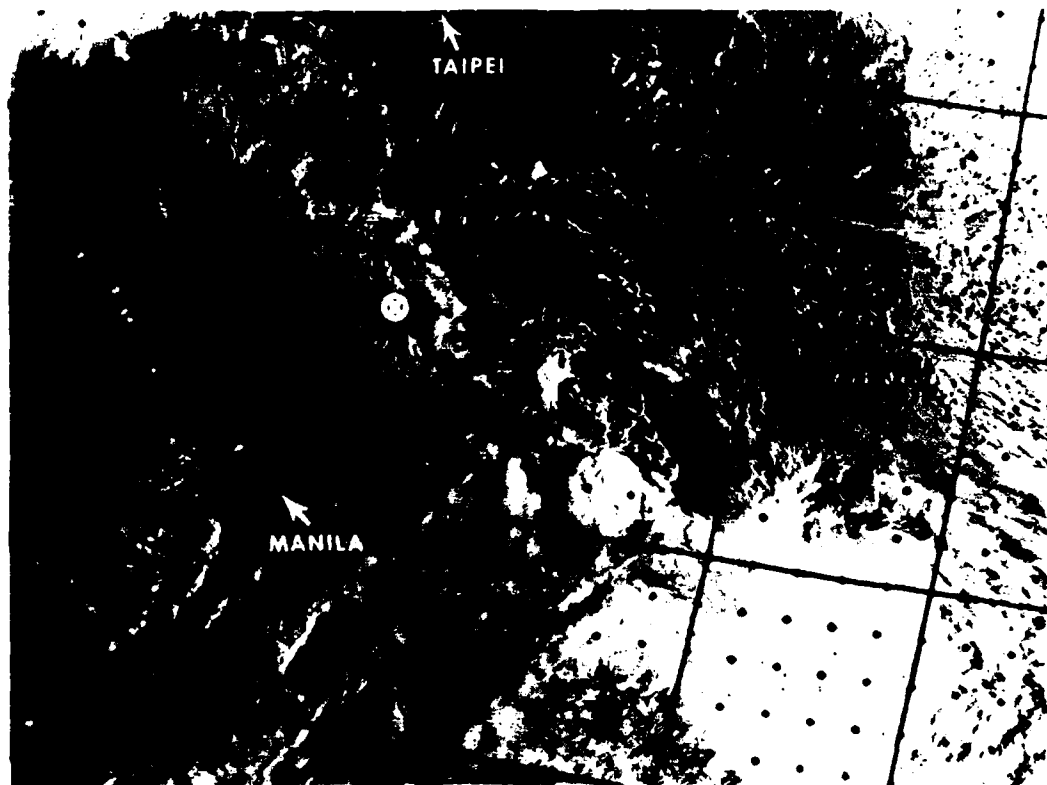
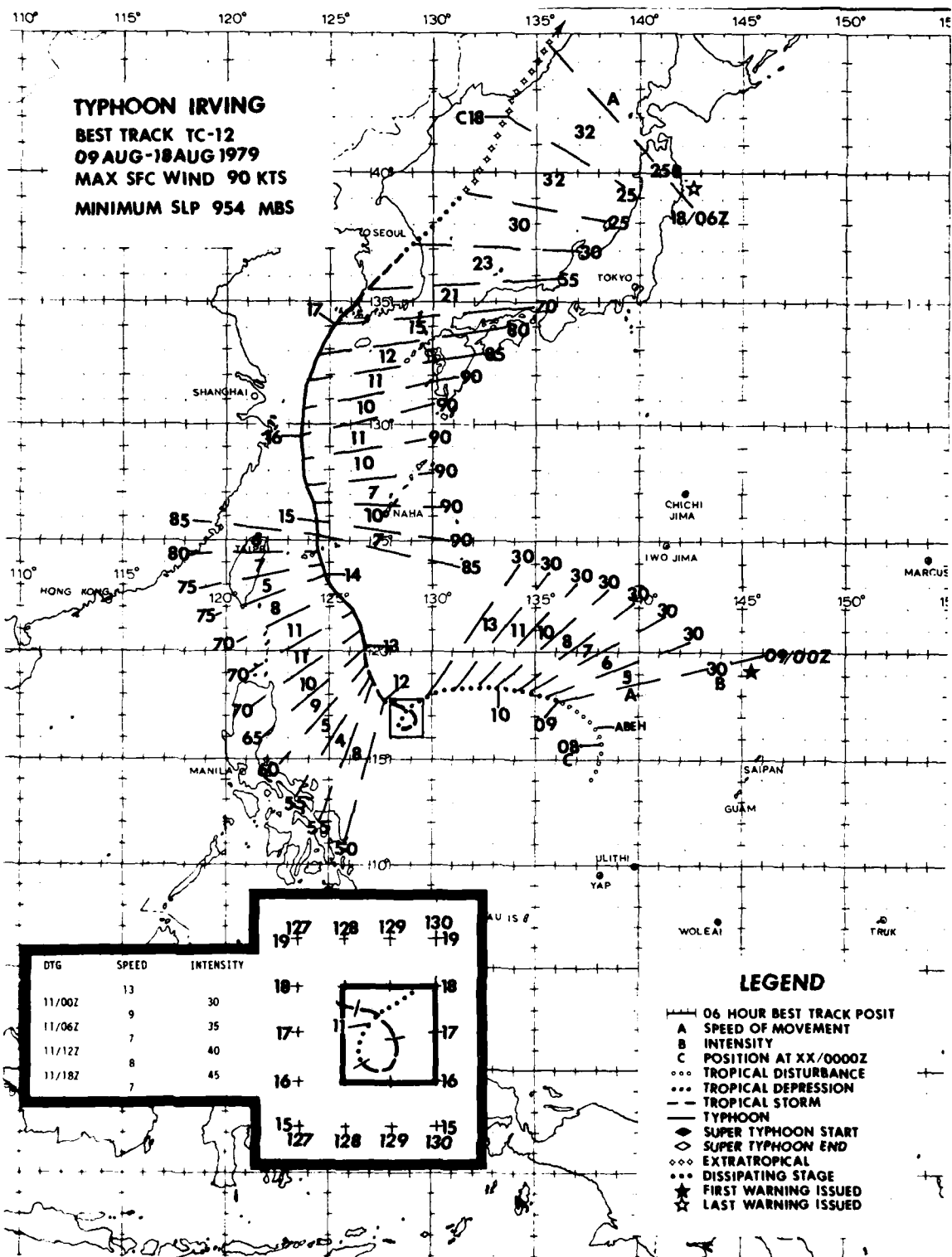


FIGURE 3-11-1. Tropical Depression 11 at 20 kt (10 m/sec) intensity, 5 August 1979, 2153Z. The TD symbol (●) is superimposed at location of surface circulation center as determined by aircraft reconnaissance at 052222Z. Considerable vertical shear existed over the system and was the reason that it did not develop into tropical storm strength. (DMSP imagery)



DTG	SPEED	INTENSITY
11/00Z	13	30
11/06Z	9	35
11/12Z	7	40
11/18Z	8	45

Surges in the southwest monsoon frequent the western North Pacific during the early tropical cyclone season and produce widespread convection from the Malay Peninsula to as far east as Guam. During the same period, the 500 mb monsoon trough fluctuates eastward across the South China Sea (SCS) and occasionally into the Philippine Sea. By late July 1979, an eastward extension of the mid-level monsoon trough was the main synoptic feature west of Guam. The 500 mb trough axis extended along 15N from northern Vietnam through the central SCS and then eastward into a quasi-stationary low pressure center over the Philippine Sea.

On 7 August at 1200Z, a developing surface circulation was observed at the eastern end of the monsoon trough near 14.1N 137.7E. This weak circulation tracked cyclonically around the eastern periphery of the broad 500 mb low pressure center in the Philippine Sea. Taking on the characteristics of a monsoon depression (Ramage, 1971), Irving was described in aircraft reconnaissance data received from 9-11 August as a weak depression with poor vertical alignment and maximum surface winds located 150 to 180 nm (278 to 333 km) west of the surface center. At this stage, Irving displayed an

exposed low-level circulation in satellite imagery with maximum convection located to the west of the surface center (Fig. 3-12-1). Ship synoptic data during the same period indicated that 25-35 kt (13-18 m/sec) winds extended outward 120 nm (222 km) south of the surface center.

By the 11th, the monsoon surge had weakened and receded westward, leaving a cut-off 500 mb low over the Philippine Sea in the vicinity of Irving's surface circulation. Irving executed a small, tight cyclonic loop on the 11th. During the loop, vertical alignment between the surface and the 500 mb center improved, and Irving intensified to tropical storm intensity. Simultaneously, a break developed in the 500 mb subtropical ridge to the north, and Irving tracked north-northwestward towards the Ryukyu Islands while intensifying further to typhoon strength. Although originally forecast to recurve south of Japan, strengthening of the 500 mb ridge southeast of Japan caused Typhoon Irving to track over the western East China Sea and accelerate north-northeastward across Korea before merging with an extratropical frontal boundary north of Japan.

Although not a spectacular typhoon, Irving's apparent sinusoidal motion, unusually large wind radii, failure to rapidly deepen and damage to southern Korea are noteworthy. Sinusoidal motion of tropical cyclones has been observed for many years, especially when short-term movements are observed by accurate fix platforms such as land radar (Fig. 3-12-2) and reconnaissance aircraft. Sinusoidal motion was observed from 131600Z to 151800Z as Irving tracked north-northwestward through the East China Sea. Radar reports from the Ryukyu Islands

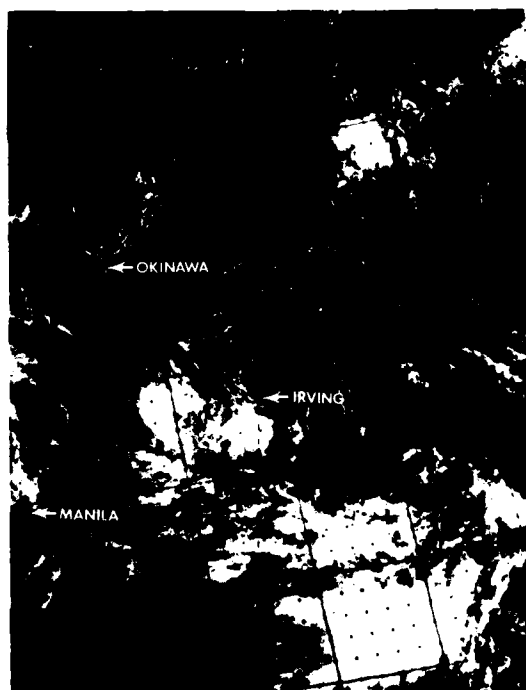


FIGURE 3-12-1. Typhoon Irving as a weak tropical depression with an exposed low-level circulation, 10 August 1979, 0126Z. Prior to intensification, aircraft reconnaissance consistently observed the maximum convection to the west of the surface center. (DMSP imagery)

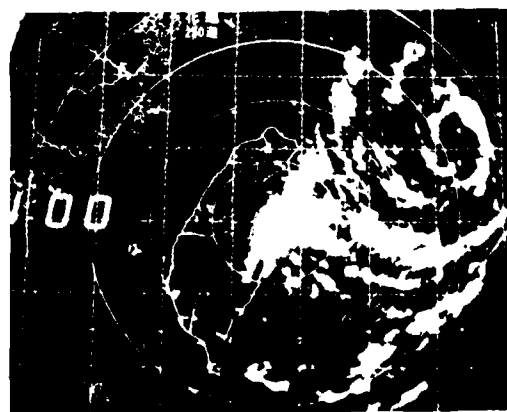


FIGURE 3-12-2. Typhoon Irving as seen by the radar at Haulien, Taiwan. Irving tracked north-northwestward across the southern Ryukyu Islands and was accurately tracked by eight radar sites, 14 August 1979, 1700Z. (Photograph courtesy of the Central Weather Bureau, Taipei, Taiwan)

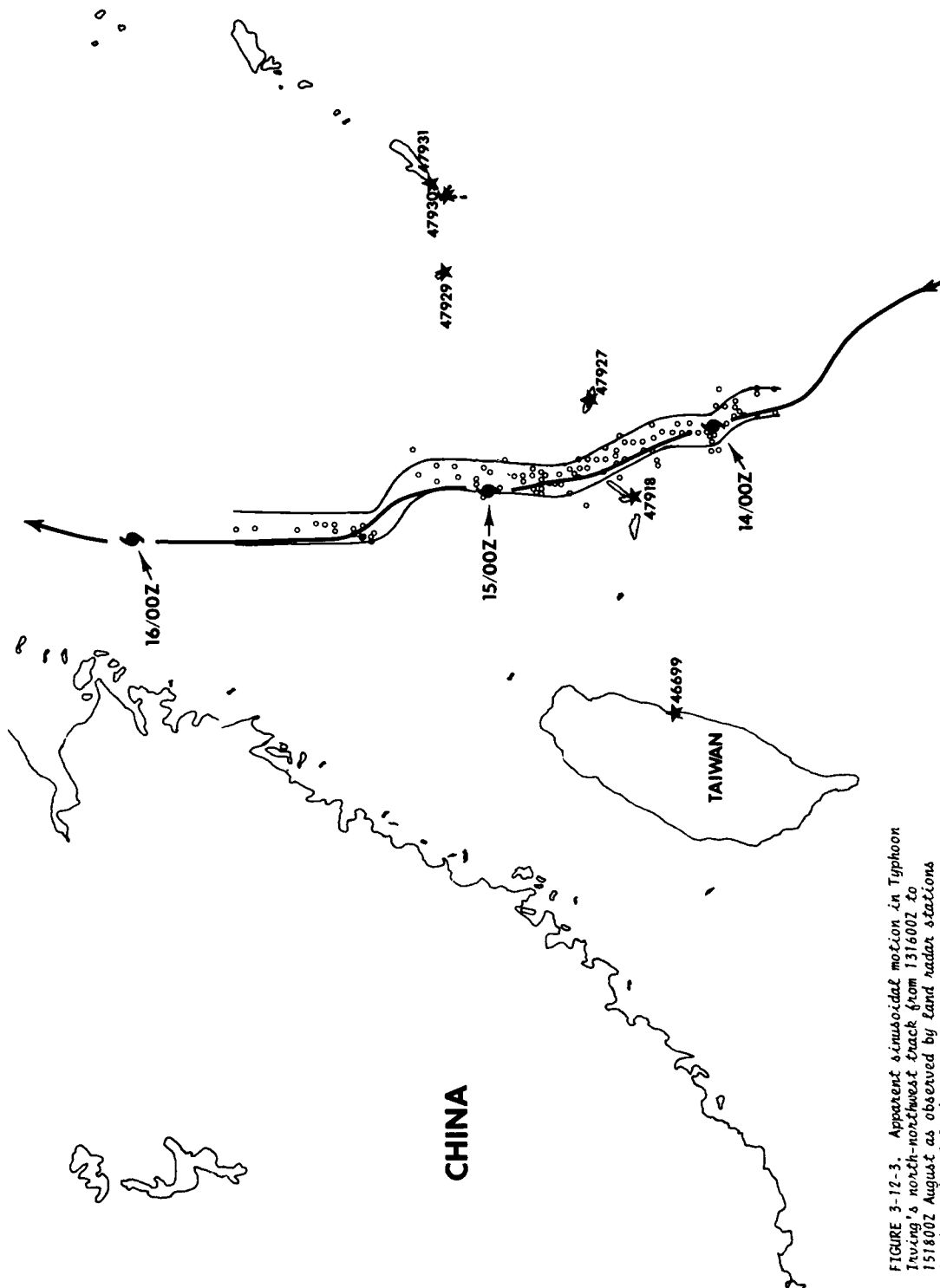


FIGURE 3-12-3. Apparent sinusoidal motion in Typhoon Irving's north-northwest track from 131600Z to 151800Z August as observed by land radar stations in the Ryukyu Islands.

clearly indicate that Irving oscillated about an overall north-northwest track (Fig. 3-12-3).

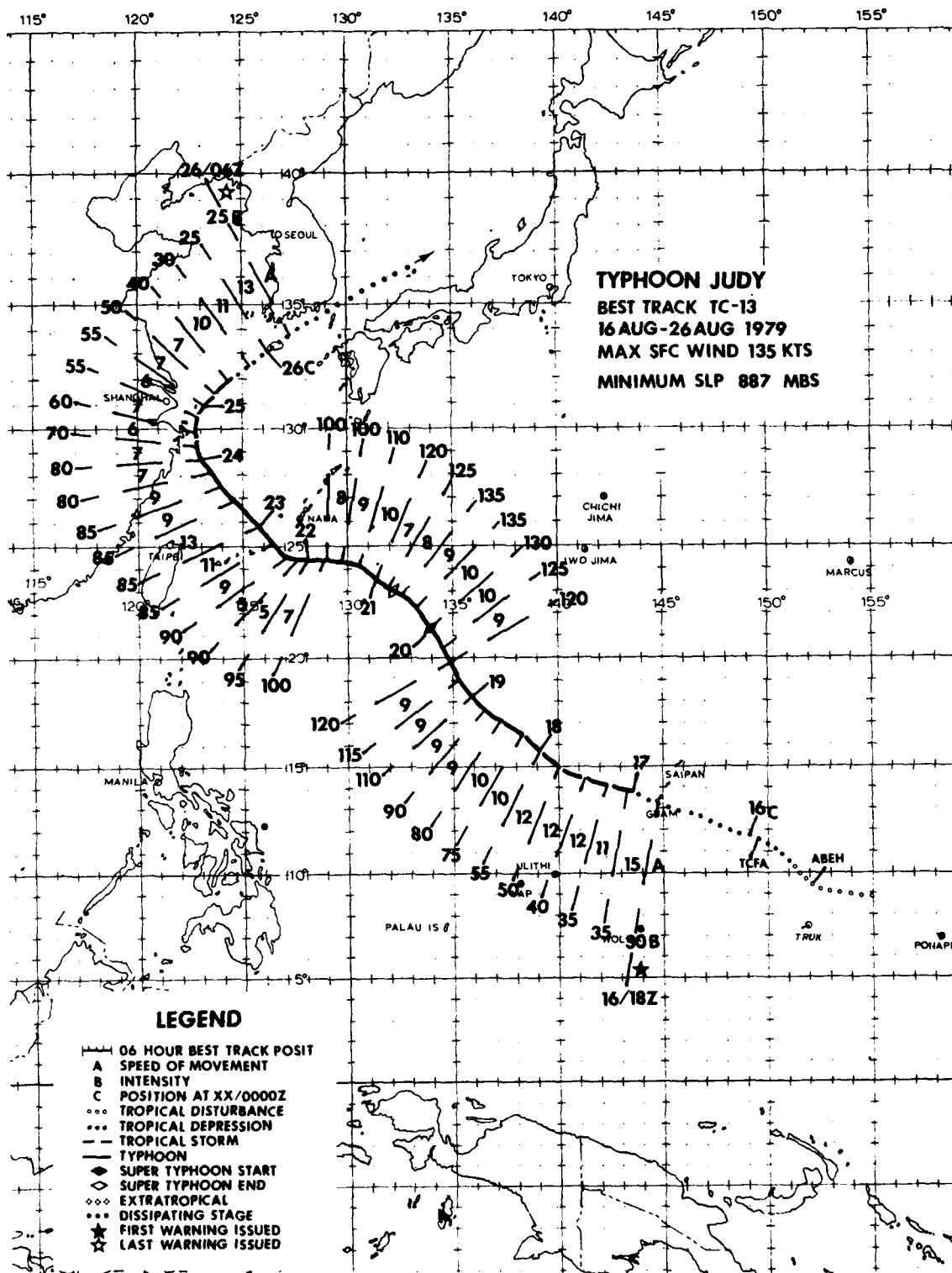
The relationship between Irving's surface and 500 mb centers during the earlier stages of development produced unusually large surface wind radii. Synoptic and aircraft data between 092000Z and 120000Z indicate that Irving's maximum wind band actually existed 150-200 nm (278-370 km) west of the large, calm-wind surface center. Although the maximum wind bands did eventually migrate towards the surface center, the wind radii remained large for the duration of Irving. The large wind radii may be related to Irving's developmental interaction with the 500 mb monsoon low and its large areal extent. Irving never became a tight, well-developed tropical cyclone. Aircraft reconnaissance during the period of eyewall development indicated that Irving had a large 30 nm (56 km) diameter eye with the radius of over 30 kt (15 m/sec) winds extending outward 400 nm (741 km) in the eastern semicircle.

Unlike Super Typhoon Hope, Typhoon Irving (Fig. 3-12-4) did not follow the intensification pattern suggested by JTWC's Equivalent Potential Temperature ( $\theta_e$ )/Minimum Sea-level Pressure Study. This study indicates that sea-level pressure should fall about 44 mb and maximum surface winds should intensify an average of 55 kt from the point where the  $\theta_e$  and pressure curves intersect (see Super Typhoon Hope, Figure 3-09-2). The reason why Irving failed to intensify further is not known.

Typhoon Irving was the first tropical cyclone to strike Korea in 1979. Rapidly weakening as he made landfall, Irving spared southern Korea from the destructive typhoon force winds he had maintained through most of the East China Sea. Korea did, however, receive torrential rains which produced widespread flooding. The hardest hit area was the island of Cheju Do where 4.3 inches (109.7mm) of rain were reported at Cheju. Official estimates reported 150 dead or missing, 1000-2000 homeless and approximately 10-20 million US dollars damage to food and agriculture.



FIGURE 3-12-4. Although Typhoon Irving did not develop according to intensification studies, Irving did possess good feederband activity and cirrus outflow, 14 August 1979, 0228Z. (DMSP imagery)



SUPER TYPHOON JUDY (13)

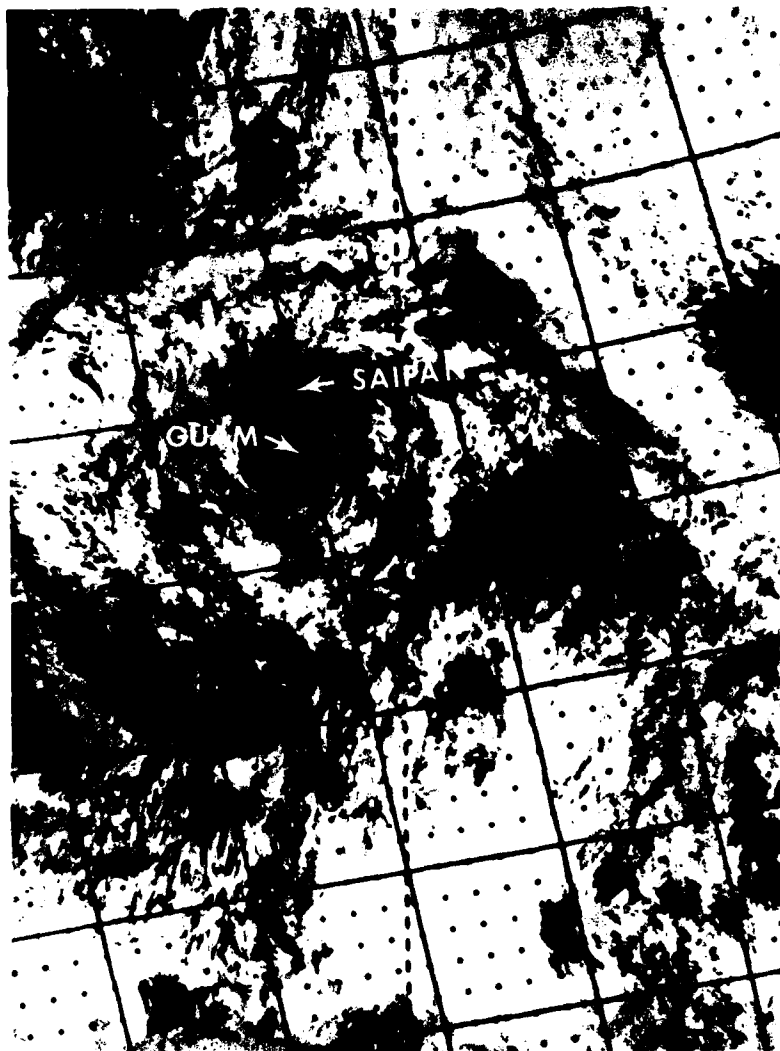


FIGURE 3-13-1. Infrared imagery of tropical disturbance (Judy) while southeast of Guam, 16 August 1979, 1120Z. The star denotes the approximate location of a weak surface center discovered by a reconnaissance aircraft about 4 hours earlier. [DMSP imagery]

Of all the typhoons of 1979, Judy's significance was only surpassed by Super Typhoon Tip. Judy eventually developed into the year's second super typhoon, but more importantly, she served as a reminder of how rapidly a minor tropical disturbance can develop into a dangerous tropical cyclone.

Surface synoptic data from the beginning to the middle of August showed that the area south and east of Guam was fairly inactive. Good cross-equatorial flow was

present, but only a few flare-ups of convective activity were noted. Surface circulations were broad, ill-defined and transient. By 15 August, however, synoptic and satellite data revealed a tropical disturbance, about 120 nm (222 km) east-northeast of Truk, which was to eventually become Typhoon Judy.

This area was closely monitored by JTWC, and when the satellite signature began to improve, a Tropical Cyclone Formation Alert was issued at 152100Z.

No significant pressure falls were observed over the area as the disturbance drifted slowly west-northwestward. A reconnaissance aircraft at 160700Z was able to define only a weak surface circulation with a MSLP of approximately 1006 mb and observed surface winds in the south semi-circle of 10 kt (5 m/sec) or less (Fig. 3-13-1).

Rapid intensification was not expected at that time, but at 161635Z, less than 10 hours after the aircraft investigation, weather radar at Andersen Air Force Base, Guam, located a well-defined circulation center moving west-northwest toward Guam at 15 kt (28 km/hr). Gradient-level wind reports from Guam, Truk, Palau and Ulithi at 161200Z also showed that the low-level inflow pattern associated with the disturbance had increased in areal extent. The disturbance continued tracking toward Guam and at 161800Z the center passed over the Naval Oceanography Command Center (NAVOCEANCOMCEN), Guam building on Nimitz Hill (Fig. 3-13-2). NAVOCEANCOMCEN reported a MSLP of 1001.0 mb and a wind gust to 51 kt (26 m/sec) at that time. Based on this "first-hand" information, JTWC issued the first warning on Tropical Storm Judy at 161900Z. Post-analysis revealed, however, that Judy did not reach tropical storm strength until 170000Z.

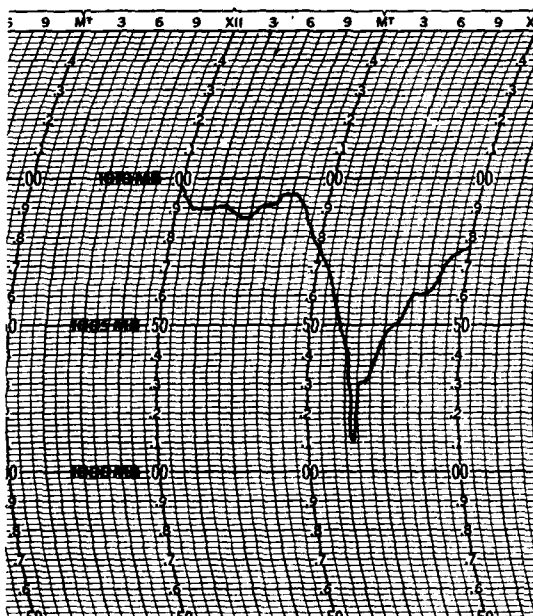


FIGURE 3-13-2. Microbarograph trace recorded at NAVOCEANCOMCEN, Guam during the passage of TD 13 (Judy) at about 161800Z, August 1979.

Judy intensified steadily while following a nearly climatological west-northwest track at 10-12 kt (19-22 km/hr) for the next 24 hours. She reached typhoon strength at approximately 180300Z. After that, a long-wave trough in the mid-level westerlies, moving over Japan toward the Pacific, fractured the subtropical mid-tropospheric ridge north of Judy, allowing her to track more to the northwest.

During the next 36-hour period, after reaching typhoon strength, Judy's central pressure dropped 69 mb and she attained super typhoon strength at 200000Z. Her lowest central pressure, 887 mb, was measured by a reconnaissance aircraft at 192145Z. Three distinct, concentric wall clouds were also noted at that time (Fig. 3-13-3). Super typhoon intensity was maintained until 201500Z, with gradual weakening thereafter.

Forecast aids indicated that Judy would pass to the south of Okinawa, but based on her persistence track and the deep trough that existed over Japan at 500 mb, Judy was forecast to recurve east of Okinawa. The steering aids were reacting to the mid-level PE Forecast series which built the ridge back between Japan and Judy. The numerical forecasts had not been verifying well up to that point, and, thus, the well-entrenched trough was forecast to persist. The numerical forecasts proved to be correct, however, and Judy did pass south of Okinawa before beginning to recurve into the East China Sea.

The rapidly intensifying ridge was expected to drive Judy into the Asian mainland south of Shanghai. The 500 mb analysis at 241200Z provided the first indication that Judy was not going to make landfall. At that time, she was just off the Chinese coast, but north of the mid-level ridge axis. Three-hourly synoptic reports from Sheng-Szu were watched closely and when the winds backed from east at 40 kt (21 m/sec) to north at 35 kt (18 m/sec), there was little doubt that Judy had, in fact, recurved to the northeast.

As Judy recurved, she was downgraded to tropical storm strength based on land synoptic data. Transition to an extratropical system occurred at 261200Z while Judy passed through the Korea Strait.

Due to being still relatively weak while passing over Guam, damage there was insignificant. Damage to Okinawa was also minimal, even though sustained winds of 40 kt (21 m/sec) were experienced for a 28-hour period. Southern Korea did not fare as well, however. One hundred eleven people were killed, over 8,000 houses were inundated, 57 vessels were destroyed and many thousands of acres of crops were ruined by Judy's torrential rains and strong winds.

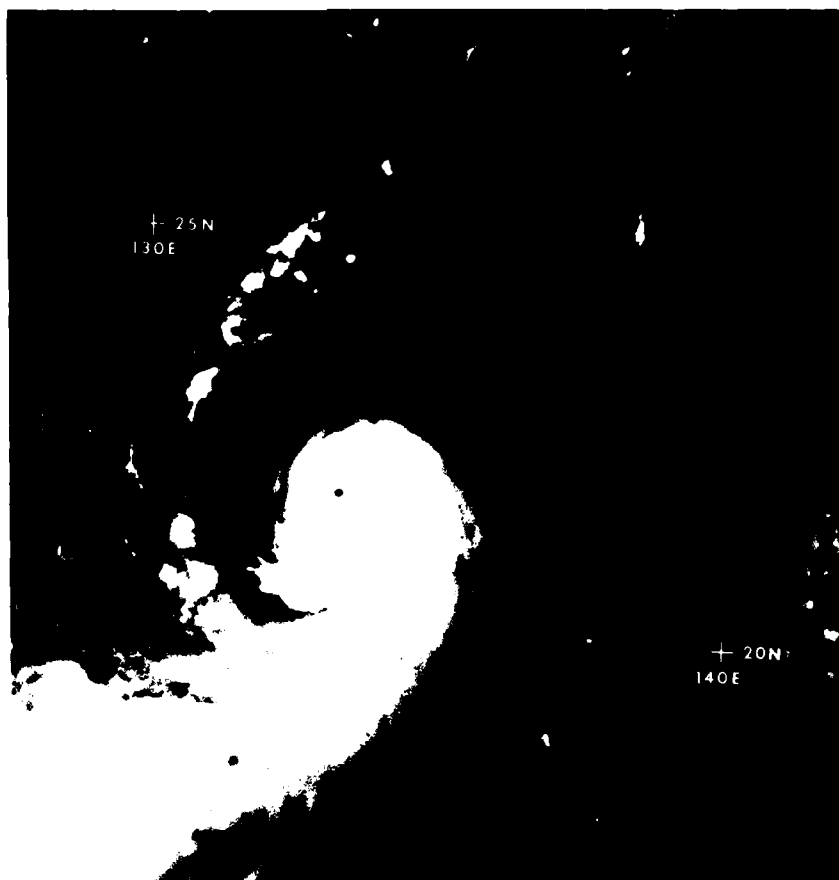
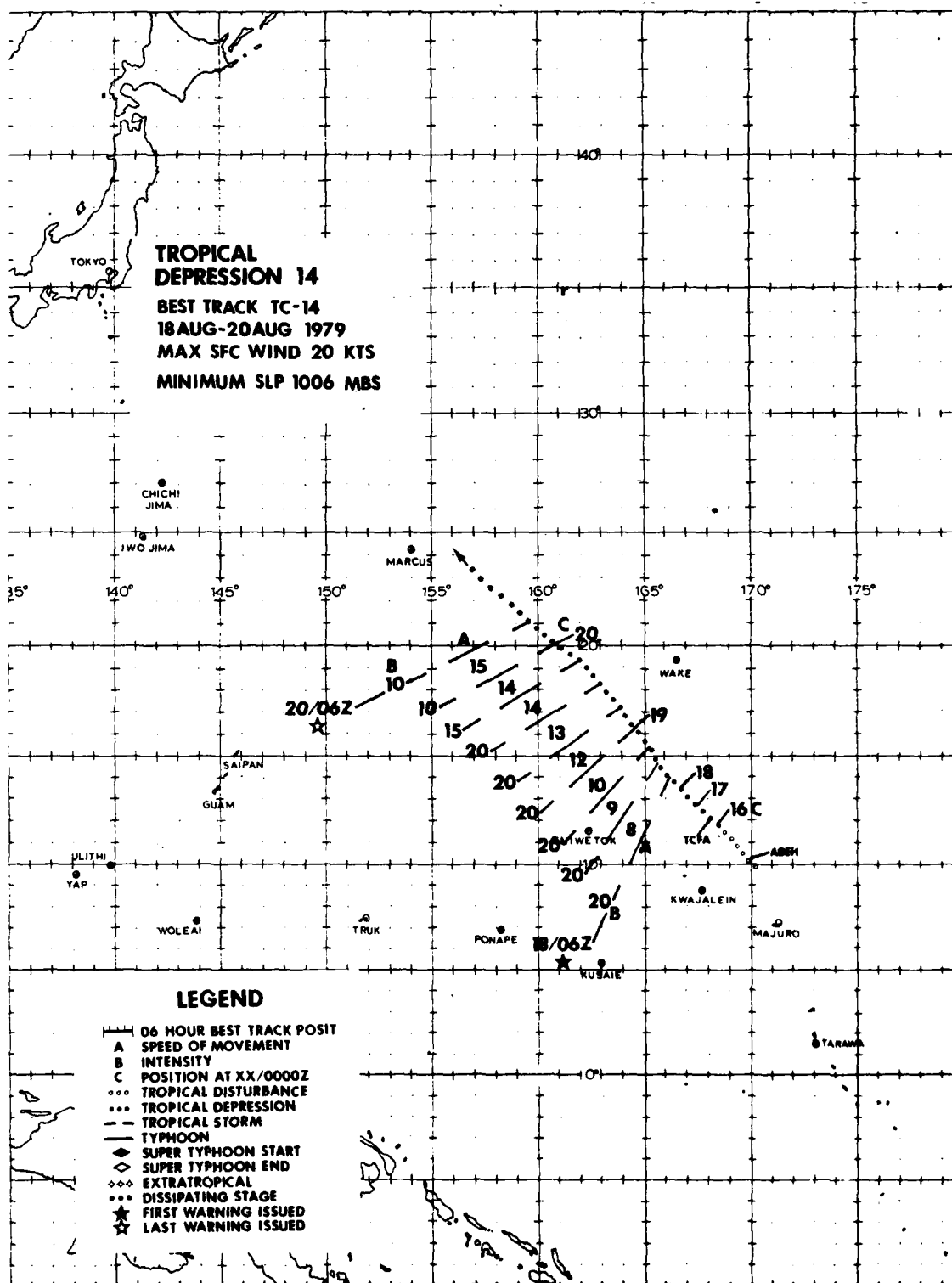
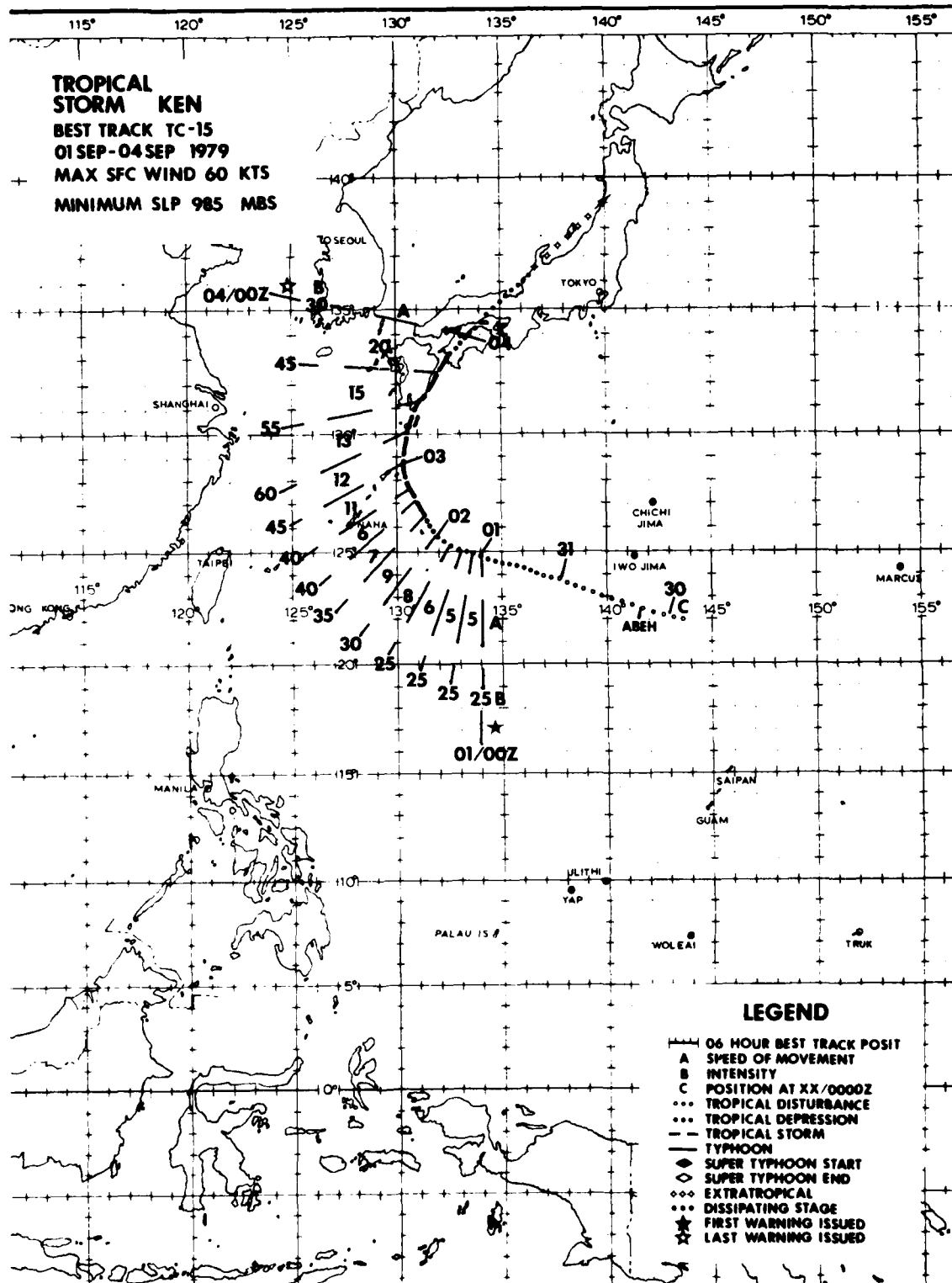
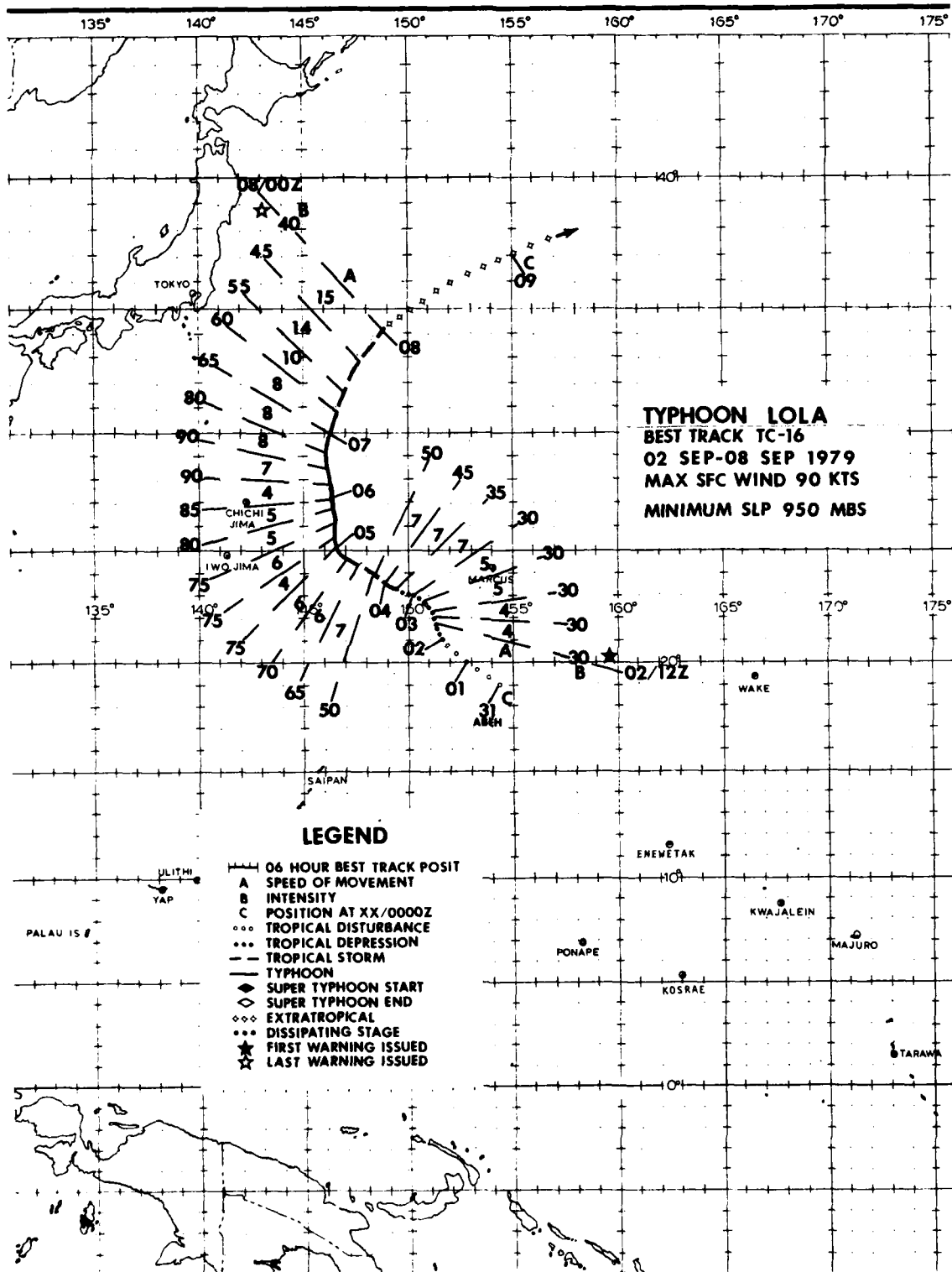


FIGURE 3-13-3. Judy as a super typhoon, 20 August 1979, 0219Z. (DMSP imagery)







TROPICAL STORM KEN (15)  
AND TYPHOON LOLA (16)

Ken and Lola developed almost concurrently along the periphery of an upper-level TUTT. Satellite imagery on 1 September 1979 (Fig. 3-16-1) shows a number of disturbances organized into a line of convection ringing the TUTT in question from north of Kadena to south of Marcus. Ken developed from the disturbance just east of Kadena. At this same time, the disturbance which developed into Lola is south of Marcus and appears quite weak. The largest and most menacing middle disturbance northwest of Guam (Fig. 3-16-1) did not develop.

During the next 48 hours, the TUTT

deepened southwestward over the middle disturbance and suppressed its convection. At the same time, it divided the convective line into the two distinct systems, Ken and Lola (Fig. 3-16-2).

After forming, Ken and Lola began to move in similar recurvature tracks. Ken tracked northward into the Sea of Japan reaching a maximum intensity of 60 kt (31 m/sec). Lola intensified into a typhoon and eventually transitioned into an extra-tropical system over the cooler waters east of Japan.

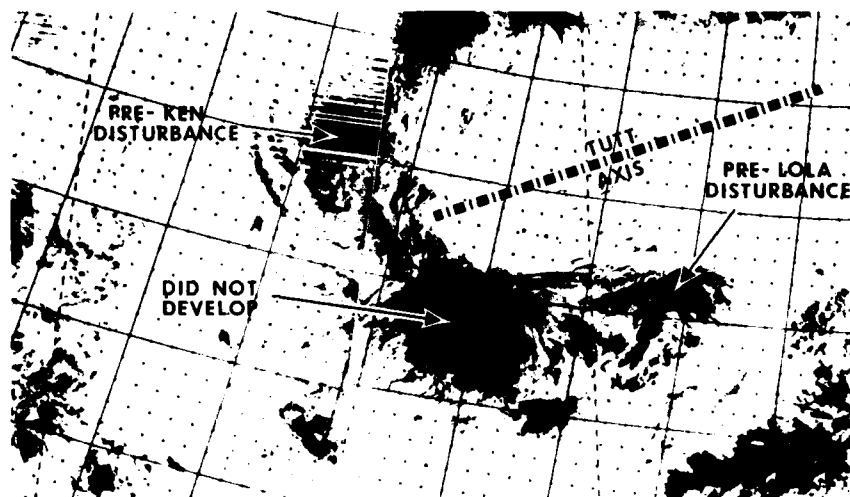


FIGURE 3-16-1. Line of tropical disturbances from which TS Ken and TV Lola eventually developed, 312257Z Aug - 010039Z Sep 1979. (DMSP imagery)

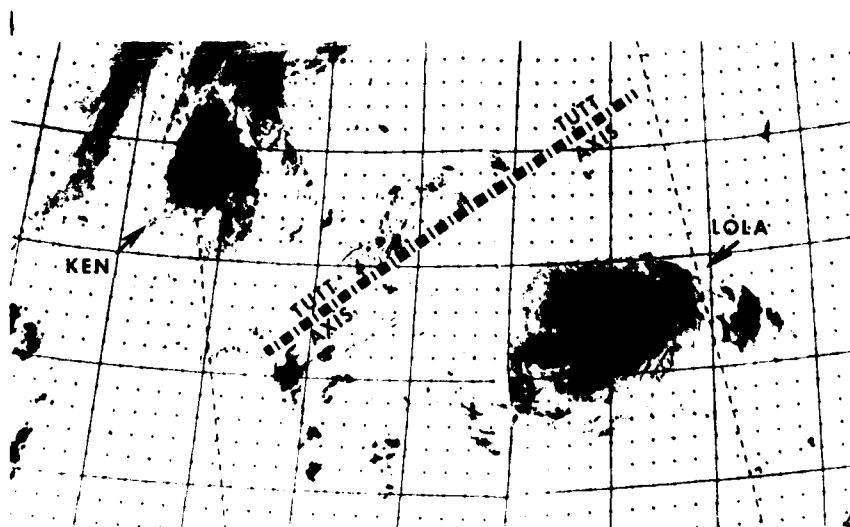
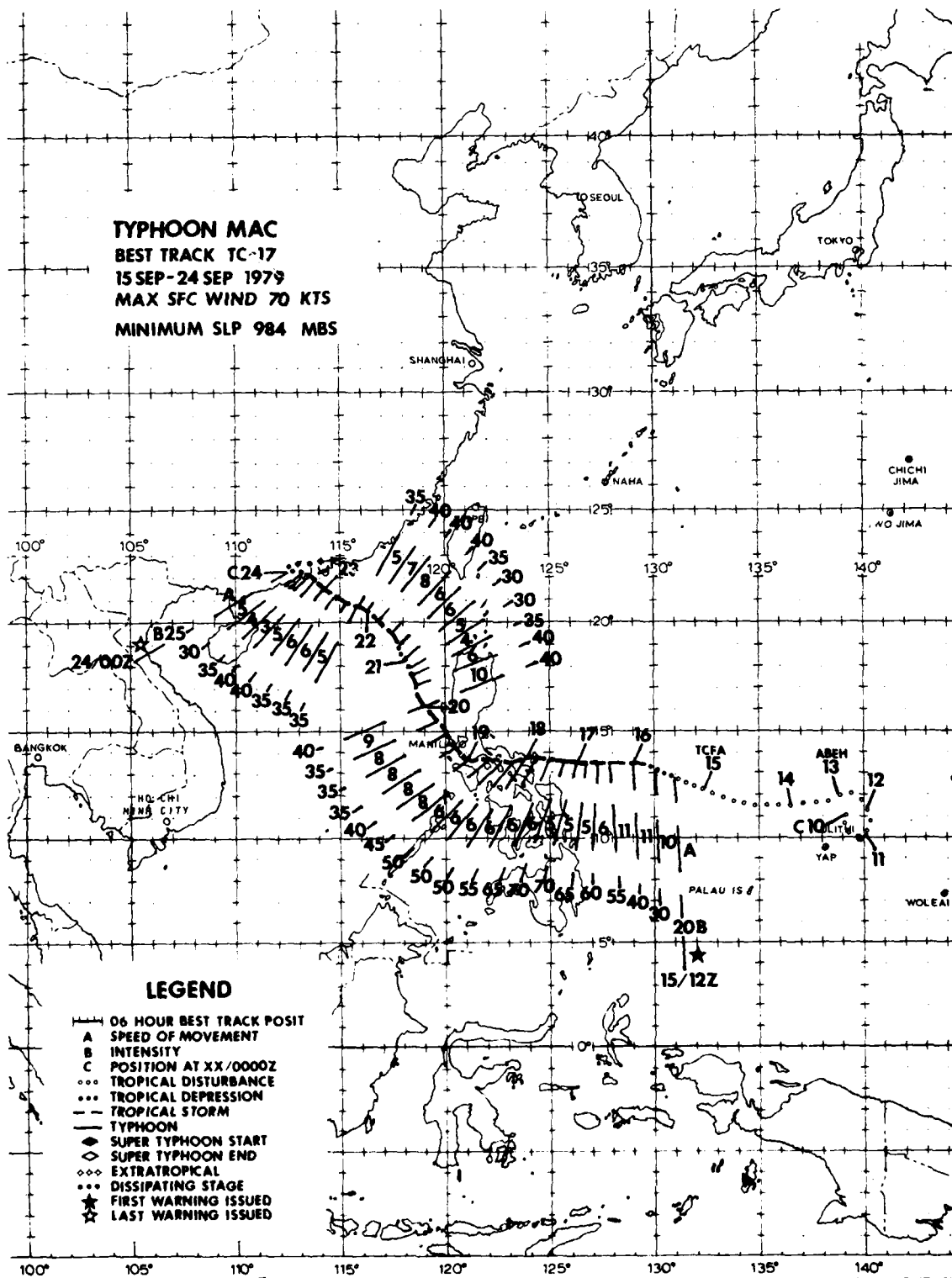


FIGURE 3-16-2. Ken at 45 kt (23 m/sec) intensity and Lola at 36 kt (15 m/sec) intensity, 022221Z - 030003Z Sep 1979. (DMSP imagery)



TYPHOON MAC (17) AND  
TROPICAL STORM NANCY (18)

Typhoon Mac developed from a weak surface circulation northeast of Yap in September 1979. This circulation tracked westward, reaching tropical storm intensity by 160000Z. Mac followed the climatological intensification rate for tropical cyclones approaching the Philippines and reached typhoon intensity prior to making landfall. Frictional effects caused Mac to weaken slowly as he tracked across southern Luzon towards the South China Sea. The unexpected development of Tropical Storm Nancy east of Hai-nan Island influenced Mac's track in the South China Sea.

JTWC's real-time forecasts do not always reflect the actual intensity of a tropical cyclone. Rapid intensification or weakening, peripheral data unavailable due to geographical restrictions, and tight maximum wind bands, which are not initially detected, all reduce the accuracy of intensity estimates provided in tropical cyclone warnings. These intensity discrepancies often go unrecognized until discovered during post-analysis, as in the case of Typhoon Mac.

Reanalysis of aircraft reconnaissance data from 16-18 September indicates that Mac most probably intensified to typhoon intensity by 161800Z. During the period 16-18 September, aircraft reconnaissance at 160503Z reported 68 kt (35 m/sec) at 1500 ft (457 m) and 60 kt (31 m/sec) on the surface prior to encountering moderate turbulence which forced the aircraft to climb through the overcast stratocumulus cloud layer above. Subsequent reconnaissance data at 170810Z confirmed typhoon intensity by locating 80-90 kt (41-46 m/sec) surface winds in a 10-nm (19 km) wide band tucked under the strong eastern feederband. Mac made landfall prior to the next scheduled aircraft fix with geographical constraints severely reducing peripheral data collection.

Although real-time data were available which indicated Mac had possibly reached typhoon intensity, the isolated reports of strong winds were dismissed as gusts associated with lower velocity sustained winds. (Aircraft data are occasionally not used verbatim when they fall outside reasonable limits after being analyzed with available surface reports, satellite data intensity estimates and the JTWC Maximum-Wind Minimum-Pressure Relationship (Atkinson and Holliday, 1977).) During post-analysis, the reconnaissance data were re-examined using an intensity study of tropical cyclones crossing the Philippines (Sikora, 1976). For typhoons with maximum sustained winds of less than 80 kt (41 m/sec), the study shows that an average intensification of 30 kt (15 m/sec) can be expected for tropical cyclones which follow a track similar to Mac's. Reanalysis of the period between 151800Z and 180000Z shows, in fact, that Mac intensified to typhoon intensity before weakening from frictional effects over Catanduanes Island on 18 September (Fig. 3-17-1).

The unexpected development of a second tropical cyclone in the South China Sea (SCS) produced a series of track and intensity modifications in Typhoon Mac. Upon exiting the Philippines, Mac, which was originally forecast to track west-northwest into the SCS, began a Fujiwhara interaction (Fig. 3-18-2) with the rapidly developing Tropical Storm Nancy located near Hai-nan Island. Instead of tracking west-northwest, Mac tracked north-northwest, skirting Cubi Point Naval Air Station, Philippines, on his new track toward Hong Kong. Strong anticyclonic outflow from Nancy sheared Mac's convection towards the southwest with aircraft reconnaissance reporting an exposed low-level circulation of 30-35 kt (15-18 m/sec) intensity on the 20th.

Weak steering currents allowed Nancy to take a cyclonic track across southern Hai-nan Island before heading southwestward into Vietnam. Nancy's southwestward track towards landfall forced Mac further north than originally forecast. Mac eventually passed just south of Hong Kong. Ironically, Nancy's development, which caused Mac to track towards Hong Kong, also helped to spare Hong Kong from potential typhoon force winds. Nancy's upper-level outflow, which dominated the SCS from 19-23 September, produced strong vertical shear over Mac and slowed his rate of reintensification. Typhoon Mac only reached minimal tropical storm intensity prior to making landfall west of Hong Kong.

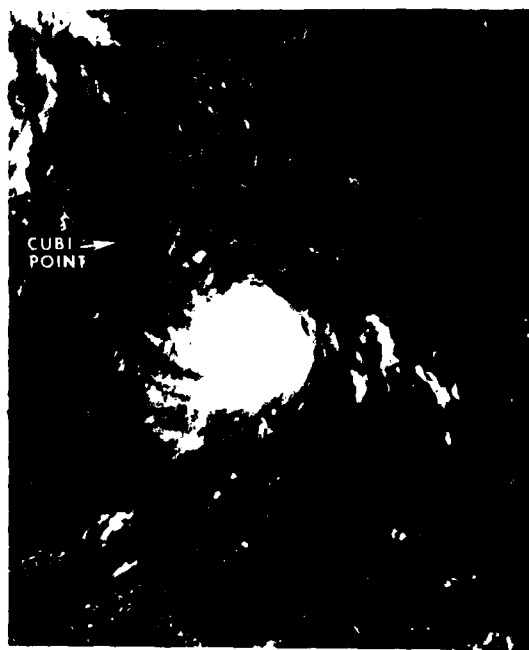
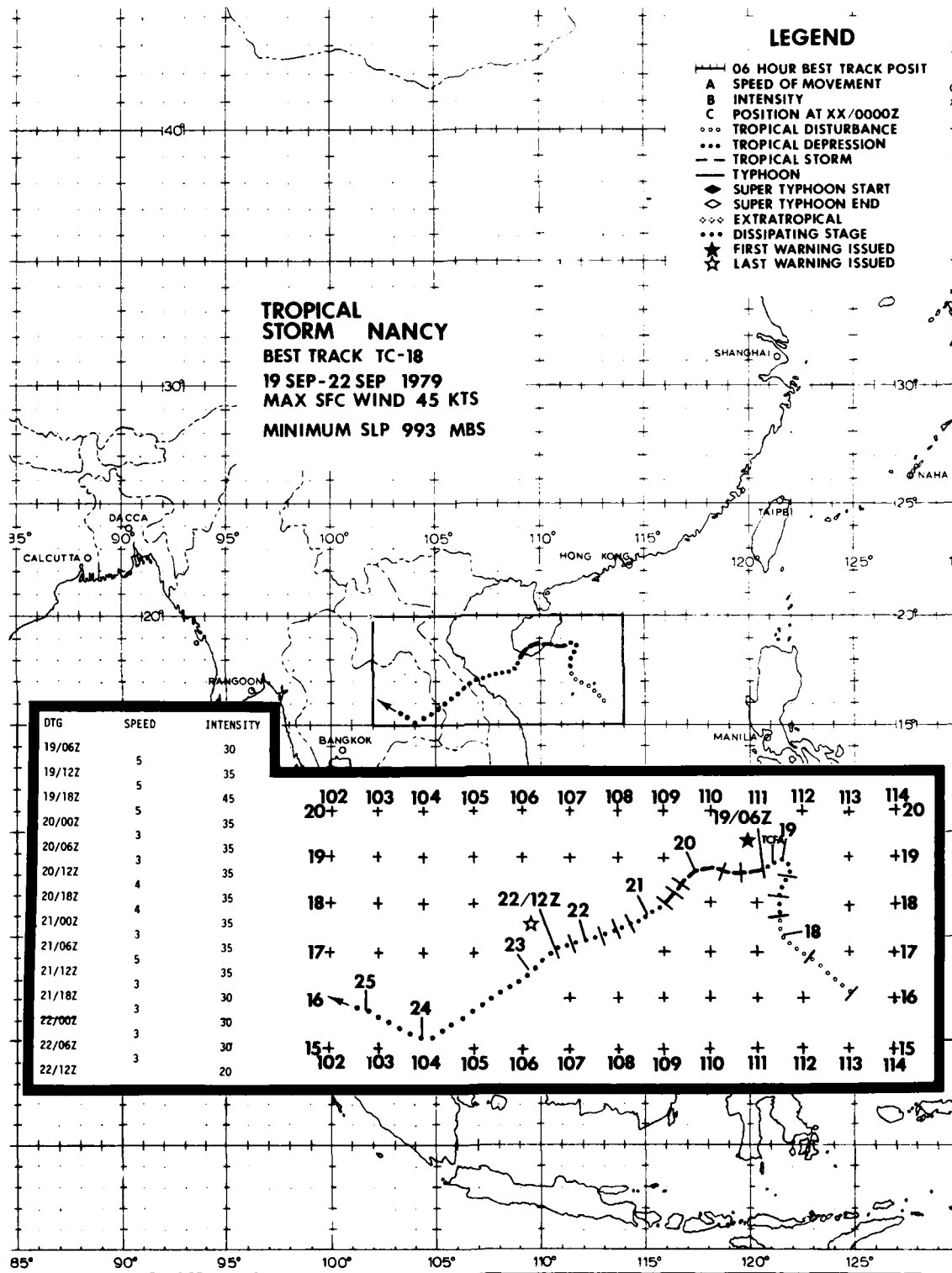


FIGURE 3-17-1. Typhoon Mac after crossing Catanduanes Island, Philippines, 18 September 1979, 0038Z. (DMSP imagery)



TROPICAL STORM NANCY (18)

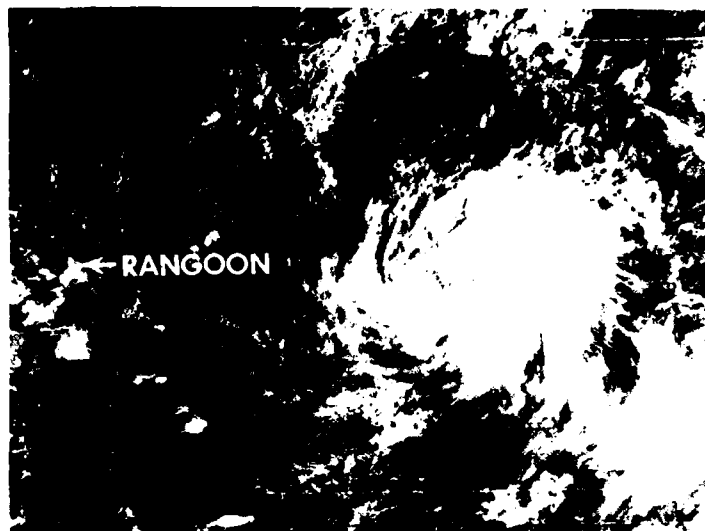


FIGURE 3-18-1. Tropical Storm Nancy at 35 kt (18 m/sec) intensity just after landfall on the southern end of Hai-nan Island, 20 September 1979, 0143Z. (DMSP imagery from Det 8, 1WW, Kadena AB, Okinawa)

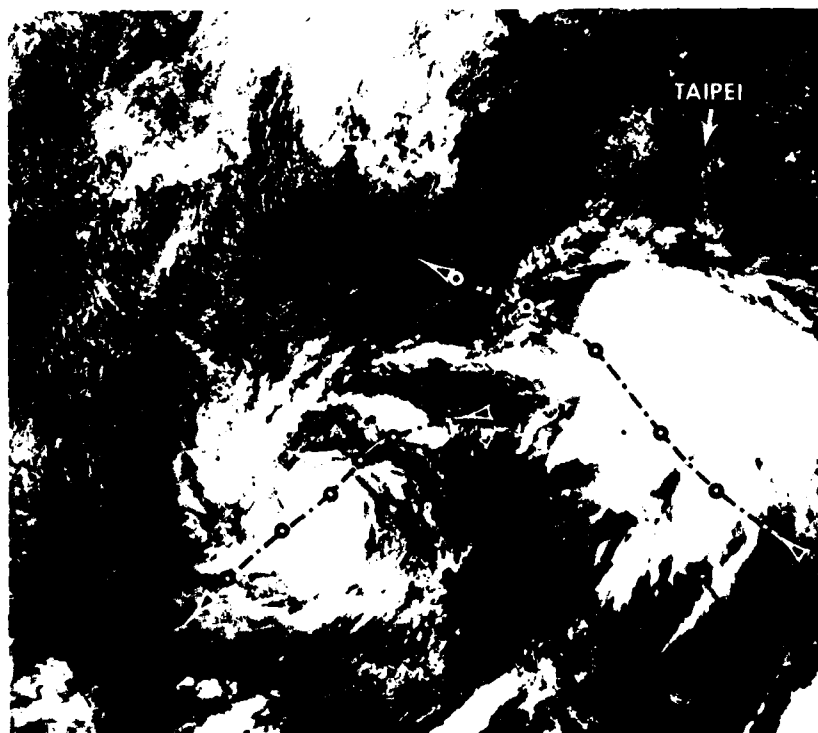
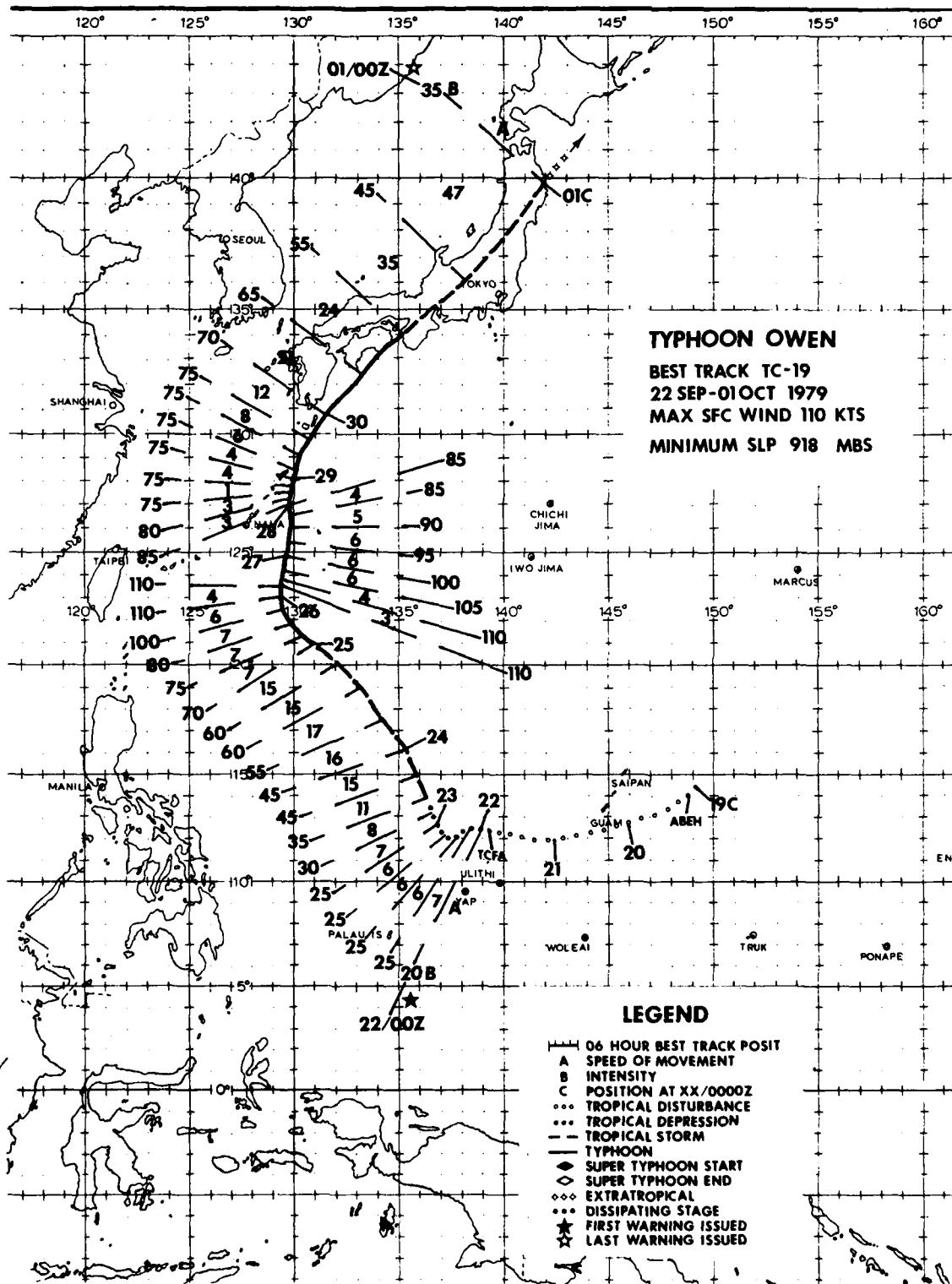


FIGURE 3-18-2. Typhoon Mac and Tropical Storm Nancy undergoing Fujiwhara interaction over the South China Sea, 22 September 1979, 0302Z. The 48-hour tracks before and after picture time are superimposed (Dots bracket 24-hour intervals). (DMSP imagery from Det 5, 1WW, Clark AB, RP)



# TYPHOON OWEN (19)

Typhoon Owen developed from a disturbance which tracked south of Guam during 20 September 1979. Two days later, satellite imagery (Fig. 3-19-1) showed that the system was organizing at the same time that aircraft reconnaissance data indicated a definite surface circulation with a 1000 mb central pressure. This prompted JTWC to issue a tropical depression warning on the system at 220000Z.

During the 2 days prior to and 1 day after 22 September, the system moved on a generally westward track at 5 to 8 kt (9 to 15 km/hr). This speed and direction was in good agreement with climatological tracks. Also, the 500 mb analysis showed a strong subtropical ridge which indicated westward steering. Based on this information, JTWC forecast westward movement for the first 8 warnings. However, Owen unexpectedly turned sharply to the north and began moving at speeds of 15 kt (28 km/hr).

Post-analysis revealed a possible reason for this movement. Figure 3-19-2 shows

the 221200Z analyses at 500 mb and 200 mb superimposed. An upper-level trough is evident on the 200 mb analysis just west of the cyclone. Southerly winds of 50 kt (26 m/sec) were observed on the eastern periphery of the trough. Considerable vertical shear existed in the layer from 500 mb to 200 mb. It appears that the steering and depth of this upper-level trough rather than 500 mb steering was the dominant feature in Owen's movement. Under its influence, Owen tracked generally northward throughout his lifetime, although undergoing major changes in speed. He slowed to a barely perceptible 1-kt (2 km/hr) movement just northeast of Okinawa (at the latitude of the subtropical ridge axis) and then dramatically accelerated to 24 kt (44 km/hr) 36 hours later under vertically consistent westerly steering. At this time, Owen made landfall near Osaka, Japan and began weakening in intensity while still accelerating to 47 kt (87 km/hr). Eventually, he transitioned into an extratropical system but not before reaching a maximum intensity of 110 kt (57 m/sec) (Fig. 3-19-3) on 26 September.

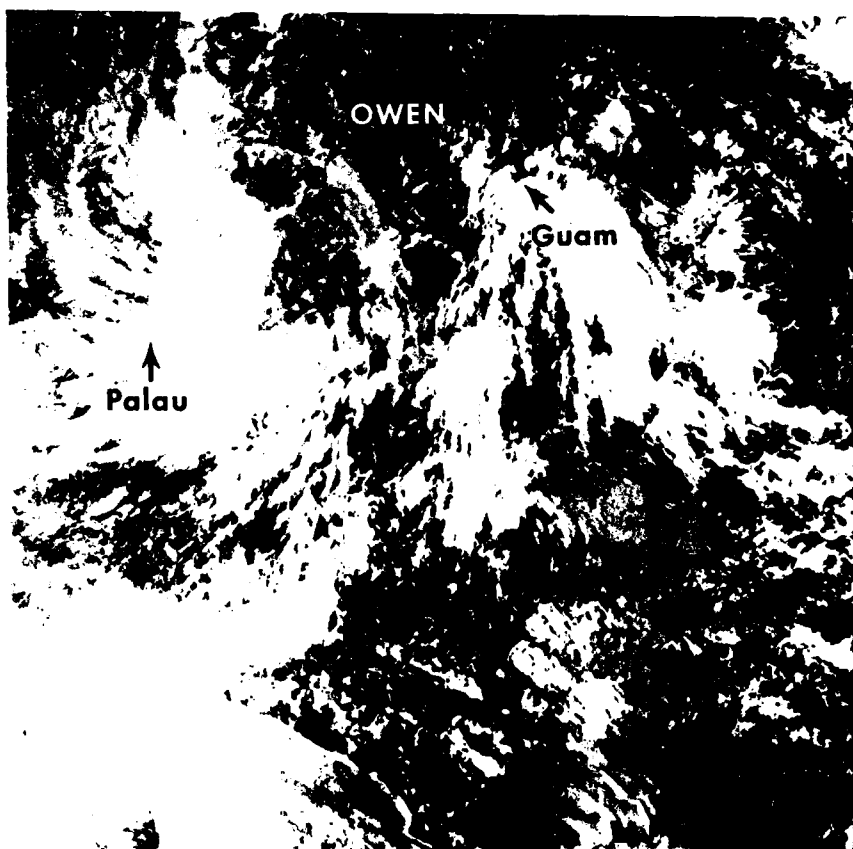


FIGURE 3-19-1. Typhoon Owen as a tropical disturbance, 21 September 1979, 2326Z. (DMSP imagery)

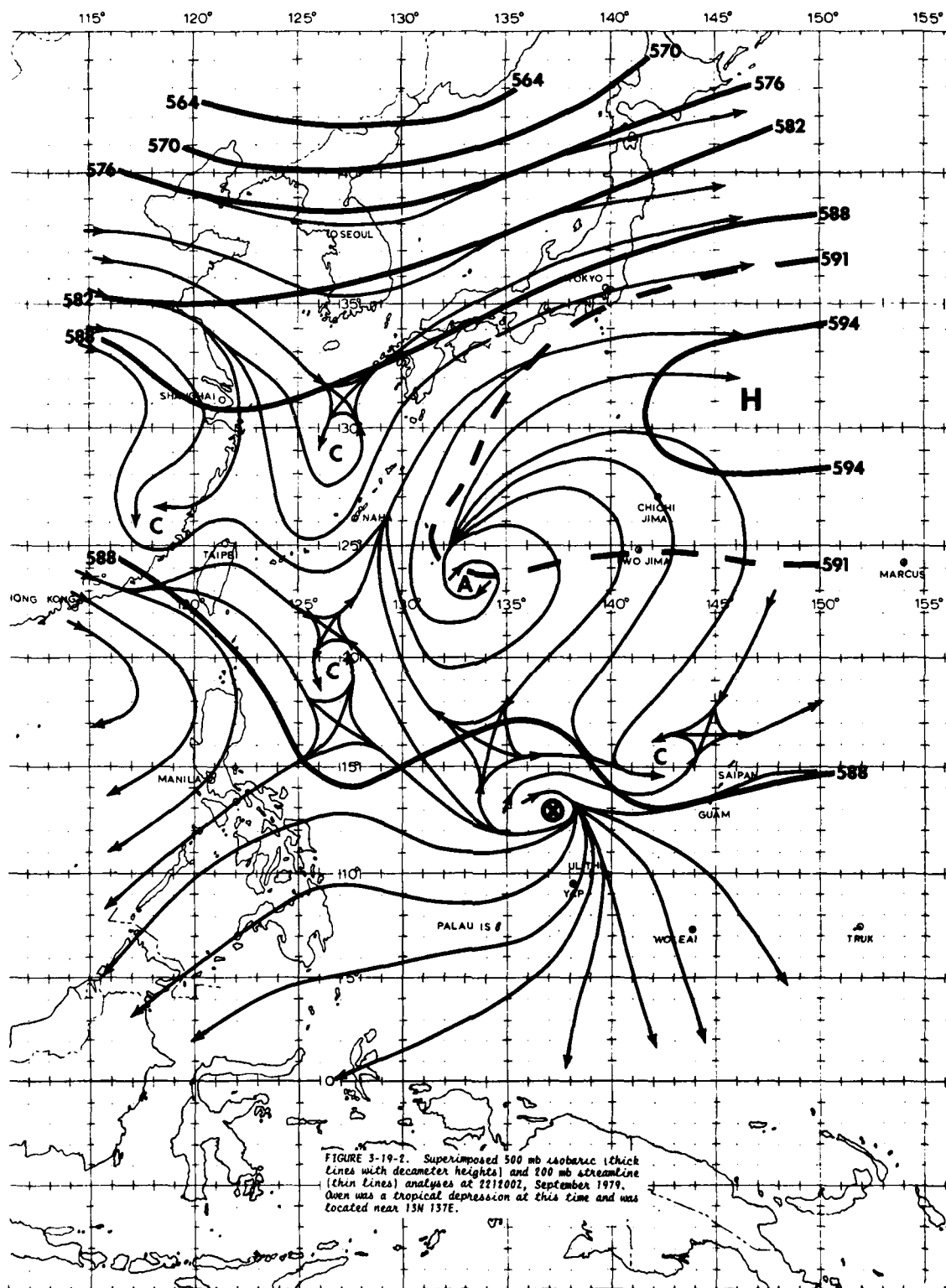
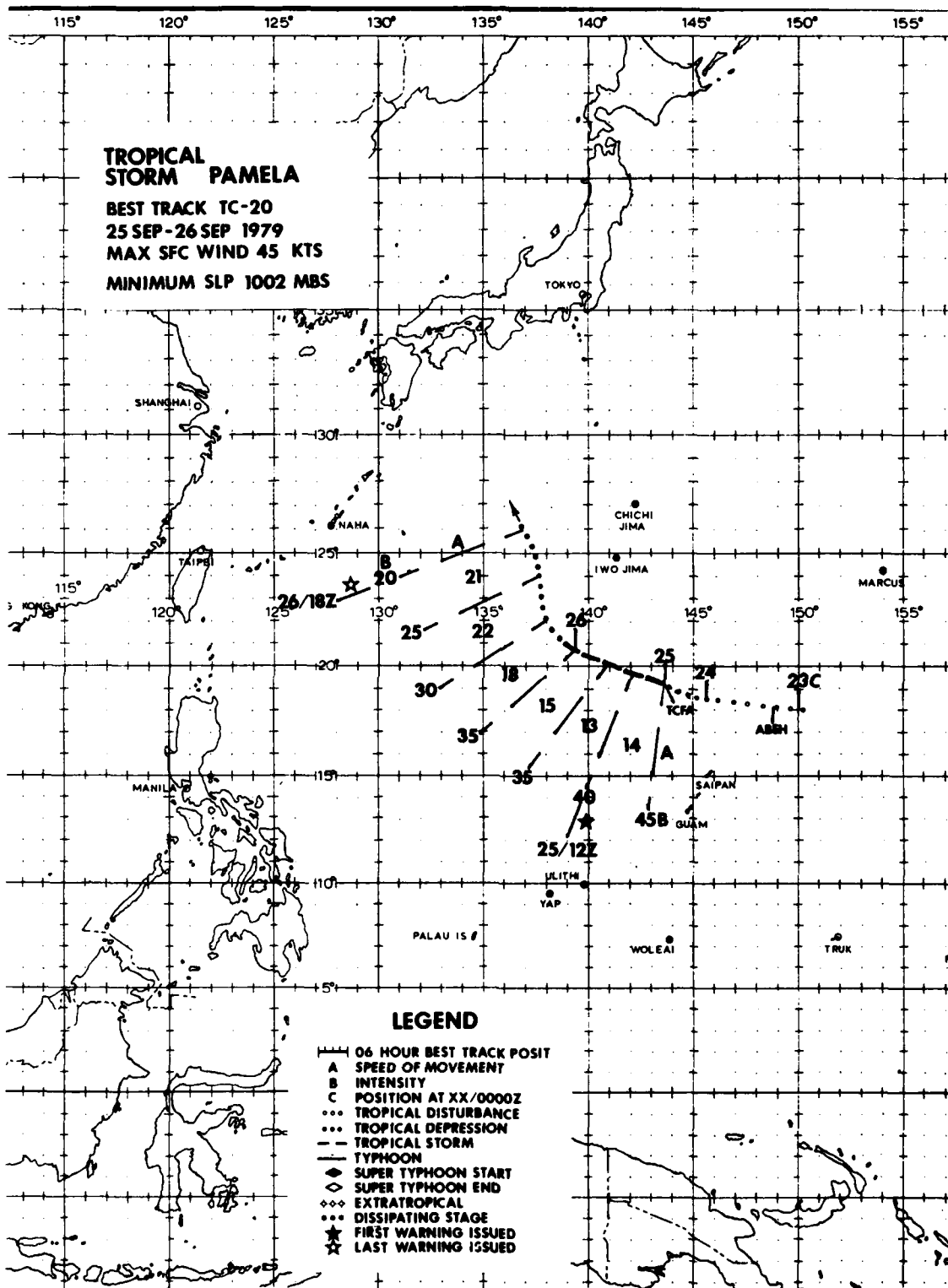




FIGURE 3-19-3. Typhoon Owen at maximum intensity of 110 kt (57 m/sec), 26 September 1979, 0145Z.  
(DMSP imagery)



# TROPICAL STORM PAMELA (20)

Developing at the apex of a wave in the easterly flow in late September 1979, Tropical Storm Pamela tracked westward, north of the Mariana Islands, and dissipated in Typhoon Owen's eastern feeder band under strong vertical shear (Fig. 3-20-1).

A JTWC pressure-wind relationship study (Atkinson and Holliday, 1977) suggested TS Pamela's maximum intensity should have ranged between 25-30 kt (13-15 m/sec) for the concomitant 1002-1003 mb minimum sea-level pressure reported. Instead, aircraft data at 250827Z reported a very narrow,

transient wind band of 60 kt (31 m/sec) north and east of the surface center. The ARWO on this mission indicated that surface winds may have been even higher than the reported 60 kt (31 m/sec). Subsequent aircraft investigations were not able to locate winds greater than 25 kt (13 m/sec). The occurrence of maximum winds which exceed the range of the JTWC tropical cyclone pressure-wind relationship is encountered several times each season. Although several explanations have been offered for these anomalies, none have been substantiated.

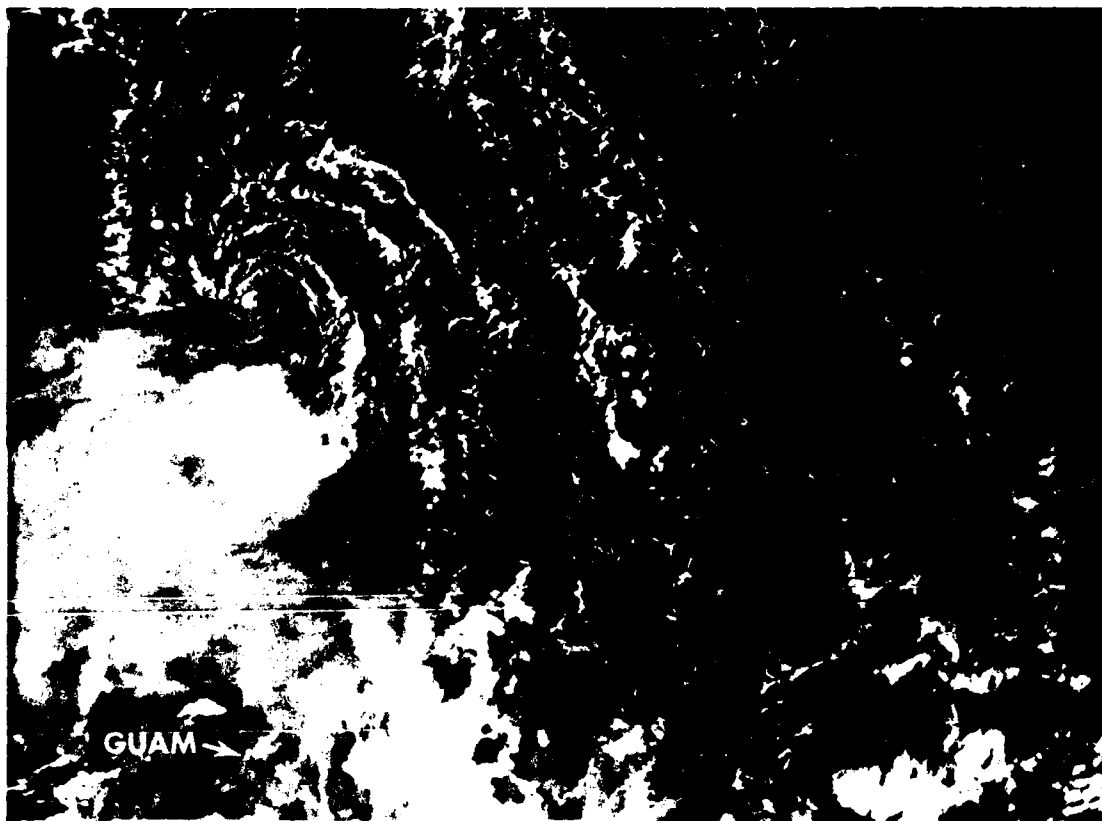
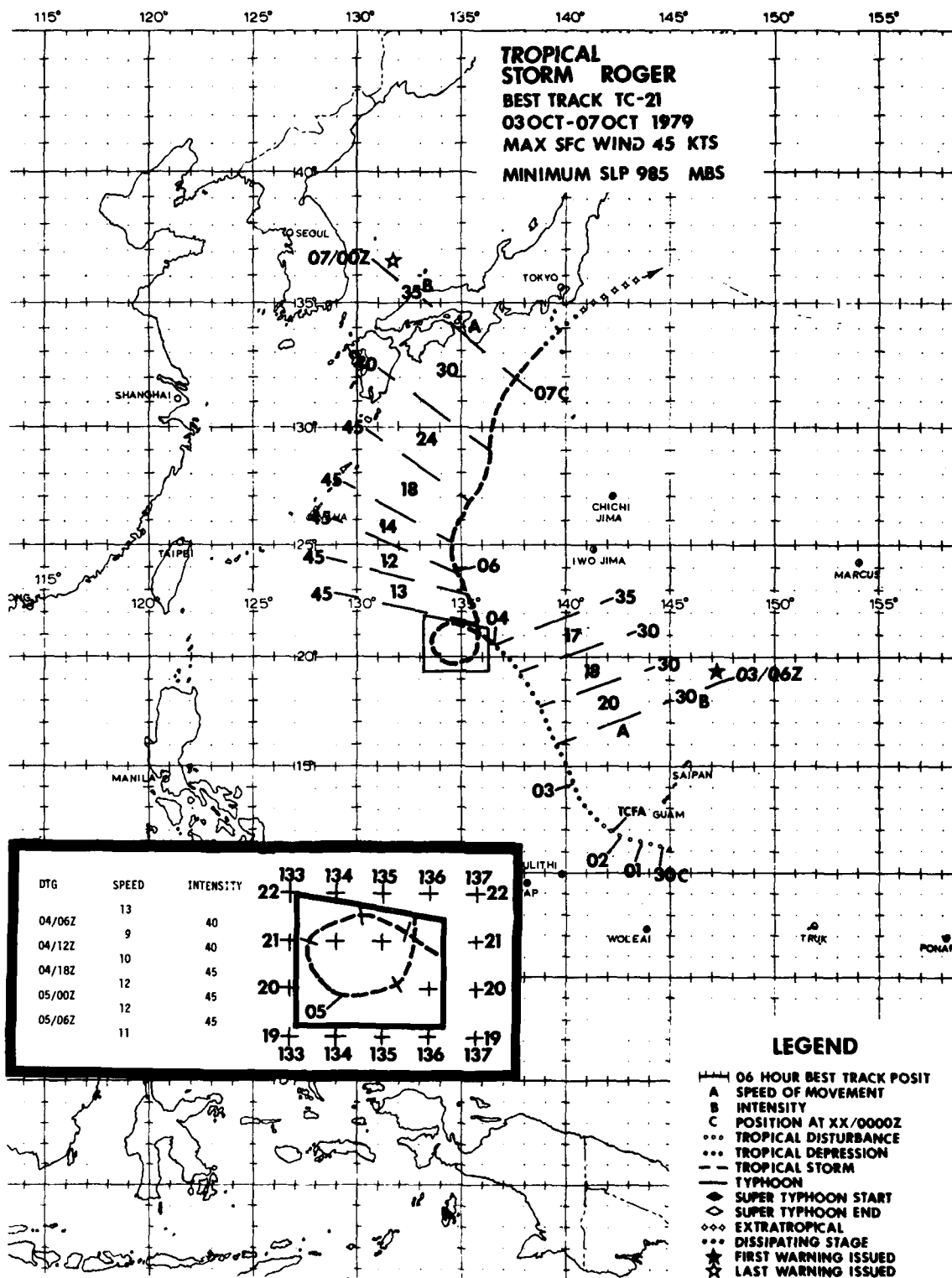


FIGURE 3-20-1. Tropical Storm Pamela with maximum sustained winds of 45 kt (23 m/sec), 24 September 1979, 2232Z. The exposed low-level circulation was a result of strong vertical shear produced by Typhoon Owen. (DMSP imagery)



# TROPICAL STORM ROGER (21)

As Typhoon Owen began recurving toward Japan, activity increased in the monsoon trough that extended over the Caroline Islands. The increased activity was noted in the Significant Tropical Weather Advisory (ABEH PGTW) on 28 September. For the next 5 days, 2 weak surface circulations and associated cloud clusters within the broad trough, one southwest of Guam and the other southeast of Guam, were closely monitored. As Owen began weakening over Japan, the southwest monsoon flow into the trough oriented NW-SE increased on 30 September, and a line of strong convective activity developed from the southern Philippines to a position south of Guam.

Post-analysis indicated the existence of a weak circulation southwest of Guam which was to become Tropical Storm Roger. During the entire time preceding the issuance of the first warning on Roger, JTWC's attention was focused on another area of major convective activity 5° west of the circulation center which was associated with strong low-level convergence and cyclonic shear. Gradient-level winds at Yap of 56 kt (29 m/sec), Palau 52 kt (27 m/sec) and Guam 28 kt (14 m/sec) are indicative of the strong low-level winds around the periphery of the trough. Thus, the initial and the reissued formation alerts (020600Z Oct and 022200Z Oct) covered the area of heavy convective activity rather than the actual surface circulation center.

Numbered warnings began at 0600Z on 3 October when a reconnaissance aircraft at

030220Z reported a surface pressure of 998 mb and estimated surface winds of 40 kt (21 m/sec) in a band of strong southwesterly flow 60 nm (111 km) south of the surface center. The aircraft also observed a calm wind center at the surface of 30 nm (56 km) in diameter with clear skies over the area.

Synoptic and satellite data at 031200Z indicated that TD 21 was beginning to separate from the broad trough as convective activity was becoming more directly associated with the circulation center (Fig. 3-21-1). TD 21 was upgraded to a tropical storm at 0600Z on 4 October based on 35 kt (18 m/sec) surface winds and a 982 mb sea-level pressure reported by aircraft reconnaissance at 040308Z. Post-analysis indicates tropical storm intensity was attained 6 hours earlier.

A break in the mid-tropospheric subtropical ridge north of Roger existed as Owen recurved over Japan. The strong mid-level southeasterly steering current along the southwestern periphery of the ridge was responsible for Roger's 15 to 20 kt (8 to 10 m/sec) northwestward movement. The ridge retreated eastward between 0000Z and 1200Z on 4 October as a mid-level trough deepened over Korea. The loss of definitive steering flow permitted Roger to execute a cyclonic loop. After emerging from the loop, Roger continued on a northwestward track until north of the ridge axis, after which he accelerated north-northeastward. Extratropical transition was complete by 070600Z as Roger merged with a cold front south of Japan.

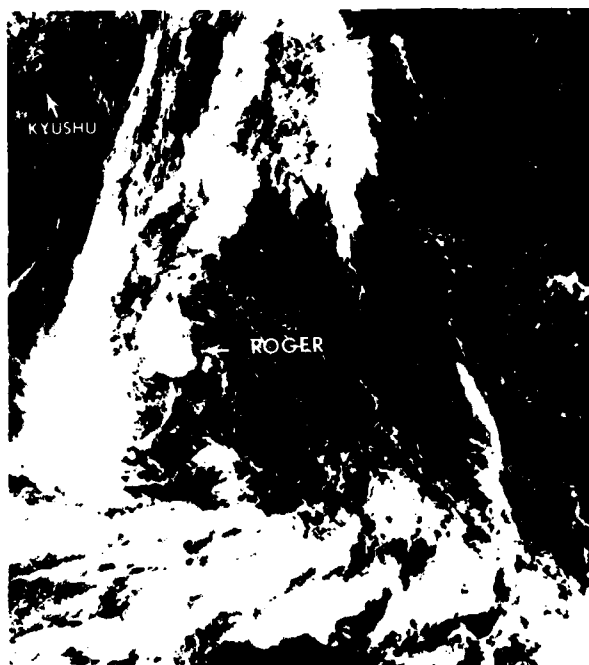
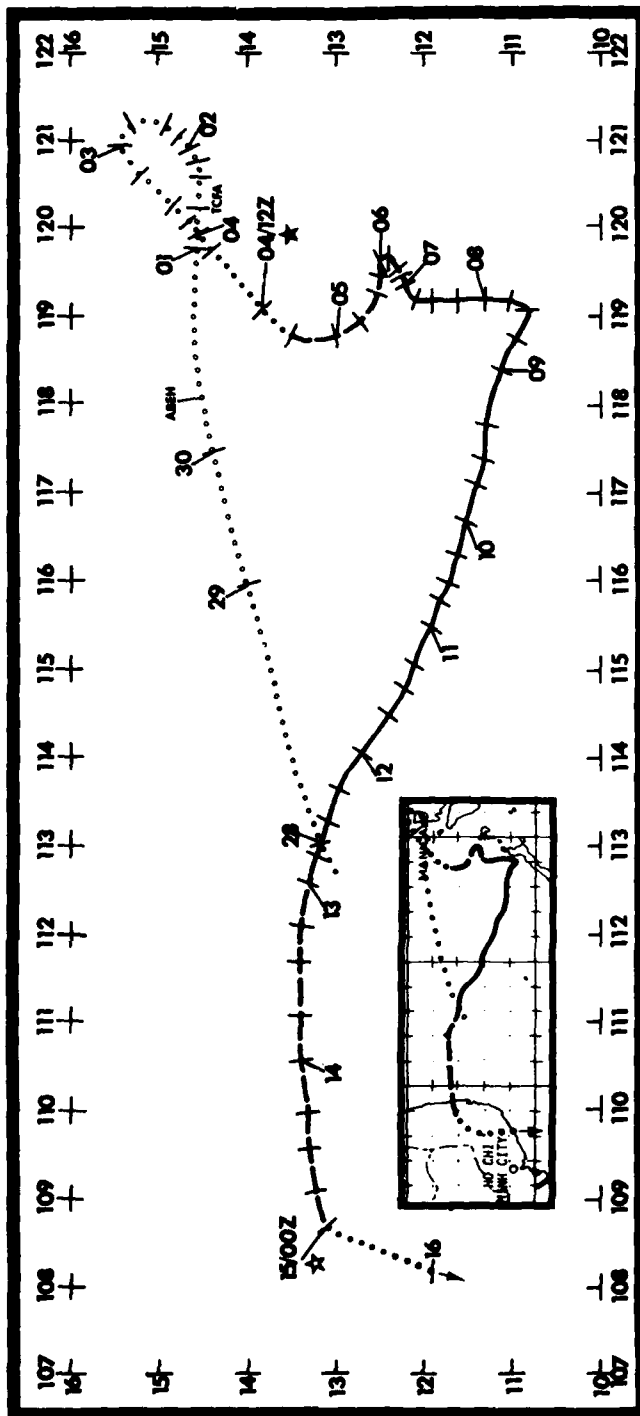


FIGURE 3-21-1. Tropical Storm Roger at 35 kt (18 m/sec) intensity 04 October 1979, 0054Z. (DNISP imagery)



**TYPHOON SARAH**  
**BEST TRACK TC-22**  
**04 OCT - 15 OCT 1979**  
**MAX SFC WIND 110 KTS**  
**MINIMUM SLP 929 MBS**

**LEGEND**

- 06 HOUR BEST TRACK POSIT
- A SPEED OF MOVEMENT
- B INTENSITY
- C POSITION AT XX/0000Z
- ... TROPICAL DISTURBANCE
- ... TROPICAL DEPRESSION
- TROPICAL STORM
- TYPHOON
- ◆ SUPER TYPHOON START
- ◇ SUPER TYPHOON END
- ◇◇◇ EXTRATROPICAL
- ... DISSIPATING STAGE
- ★ FIRST WARNING ISSUED
- ★ LAST WARNING ISSUED

DATE	SPEED	INTENSITY	DATE	SPEED	INTENSITY	DATE	SPEED	INTENSITY	DATE	SPEED	INTENSITY	DATE	SPEED	INTENSITY
04/12Z	5	30	07/18Z	3	75	10/18Z	3	100	14/00Z	6	55	14/00Z	6	55
04/18Z	5	35	08/00Z	3	75	11/00Z	4	100	14/06Z	5	50	14/06Z	5	50
05/00Z	4	40	08/06Z	3	75	11/06Z	3	90	14/12Z	5	50	14/12Z	5	50
05/06Z	4	40	08/12Z	2	75	11/12Z	3	85	14/18Z	5	35	14/18Z	5	35
05/12Z	3	40	08/18Z	3	75	11/18Z	3	75	15/00Z	5	20	15/00Z	5	20
05/18Z	2	40	08/18Z	4	75	12/00Z	4	75						
06/00Z	2	40	09/00Z	6	85	12/06Z	5	70						
06/06Z	1	40	09/06Z	5	90	12/12Z	5	65						
06/12Z	1	45	09/12Z	4	90	12/18Z	4	65						
06/18Z	1	50	09/18Z	4	95	13/00Z	4	60						
07/00Z	1	60	10/00Z	4	110	13/06Z	4	60						
07/06Z	2	75	10/06Z	3	110	13/12Z	5	60						
07/12Z	2	75	10/12Z	3	100	13/18Z	6	60						

# TYPHOON SARAH (22)

Typhoon Sarah spawned in the monsoonal trough during late September 1979. This trough extended from the southwestern portion of the South China Sea toward Luzon. A northeast monsoon surge existed north of the trough, while the southwest monsoon dominated the area south of the trough. The circulation was steered initially by the southwest monsoon and then later by the first northeast surge of the fall from the Asian mainland. During the last few days of September, the circulation meandered slowly toward Luzon under the influence of the southwest monsoon, and then looped over Luzon during the first three days of October as a mid-tropospheric short-wave trough moved eastward north of Luzon. Once the short-wave trough had moved east of the circulation, the northeast surge intensified and became more of an influence as the circulation finished its loop and began its south-southwest track.

On 5 and 6 October, Sarah, now a tropical storm, apparently was again influenced by another mid-tropospheric short-wave trough which moved across Sarah's longitudinal position and induced the brief eastward movement in her track. At this time, the southwest monsoon also increased in intensity and may have been another factor in steering Sarah eastward. For almost the entire period that Sarah was tracking southward, there was a weakness in the mid-tropospheric ridge between the Philippines and the Asian mainland, enabling Sarah's track to be influenced by short-wave troughs. This weakness in the ridge resulted in mid-tropospheric flow that was too weak to significantly affect the steering of Sarah. This weakness allowed the surface winds to dictate Sarah's direction of motion through the first 8 days of October. Figures 3-22-1 and 3-22-2 illustrate the surface and mid-level flow patterns which influenced Sarah during this phase of her track.

During Sarah's depression stage, strong easterlies in the upper-troposphere restricted Sarah's outflow to the northeast, thus inhibiting development into a tropical storm. As Sarah proceeded southward, the easterlies decreased in strength, outflow increased, and Sarah intensified to tropical storm and then typhoon strength. It is very interesting to note that Sarah intensified to typhoon strength while tracking southward which is quite unusual for a tropical cyclone. Several aircraft reconnaissance flights reported that Sarah had attained typhoon strength even though her cloud structure was not well organized.

During the first several days of October when Sarah was slowly developing to typhoon strength and moving south, Palawan Island and the central Philippines were battered by high winds and rain. These areas were inundated by flooding and landslides which caused massive crop damage and death. Many villages were cut off from any

source of food, fresh water, and other necessities for survival. Four deaths were attributed to Sarah. On 8 October, Sarah finally began to track westward and the weather finally cleared over Palawan Island and the central Philippines. Sarah's change in track was due to the strengthening of the mid-tropospheric ridge north of Sarah from Luzon across the South China Sea into Asia. Aircraft reconnaissance early on the 9th reported that Sarah's structure had become better organized. Earlier aircraft reported that Sarah was not vertically aligned; but on the 9th, the mid-level center had become vertically aligned with the surface center. With vertical alignment and improved upper-level outflow, Sarah's intensity increased to 110 kt (57 m/sec) as she became a most impressive storm. This is in contrast to her unusual origin.

After Sarah reached peak intensity early on 10 October, she began to slowly weaken as



FIGURE 3-22-3. Sarah with 60 kt (31 m/sec) intensity one day prior to landfall over Vietnam, 13 October 1979, 0136Z. (DMSP imagery)

she tracked west-northwestward (Fig. 3-22-3). Sarah continued on a west-northwest track until dissipation over Vietnam on 17 October. After 20 days, she dissipated within 300 nm (556 km) of her origin as a monsoon depression on 28 September.

FIGURES 3-22-1 and 3-22-2 are on following pages.

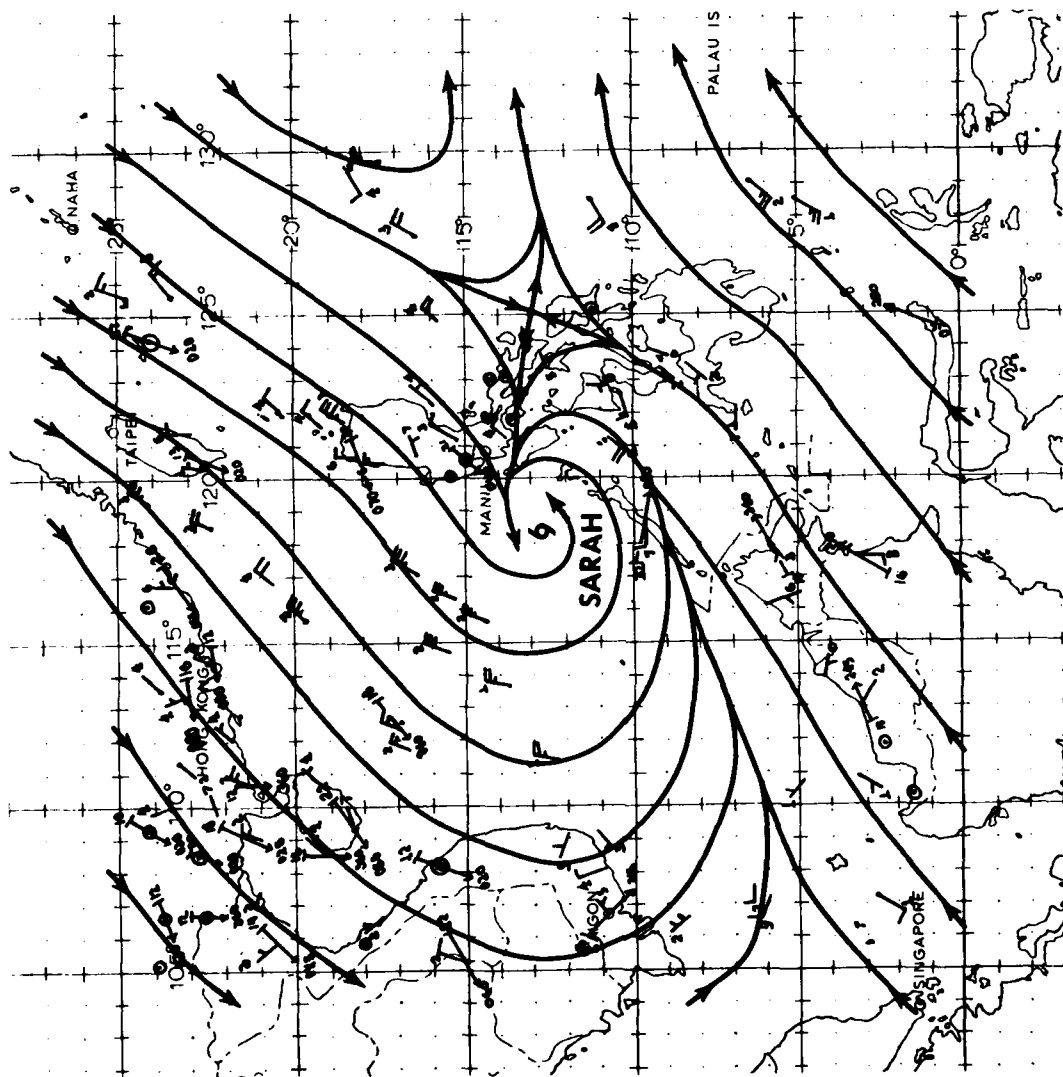


FIGURE 3-22-1. The 050000Z October 1979 surface (---) / gradient-level (ddd) (66) wind data and streamline analysis. Wind speeds are in knots.

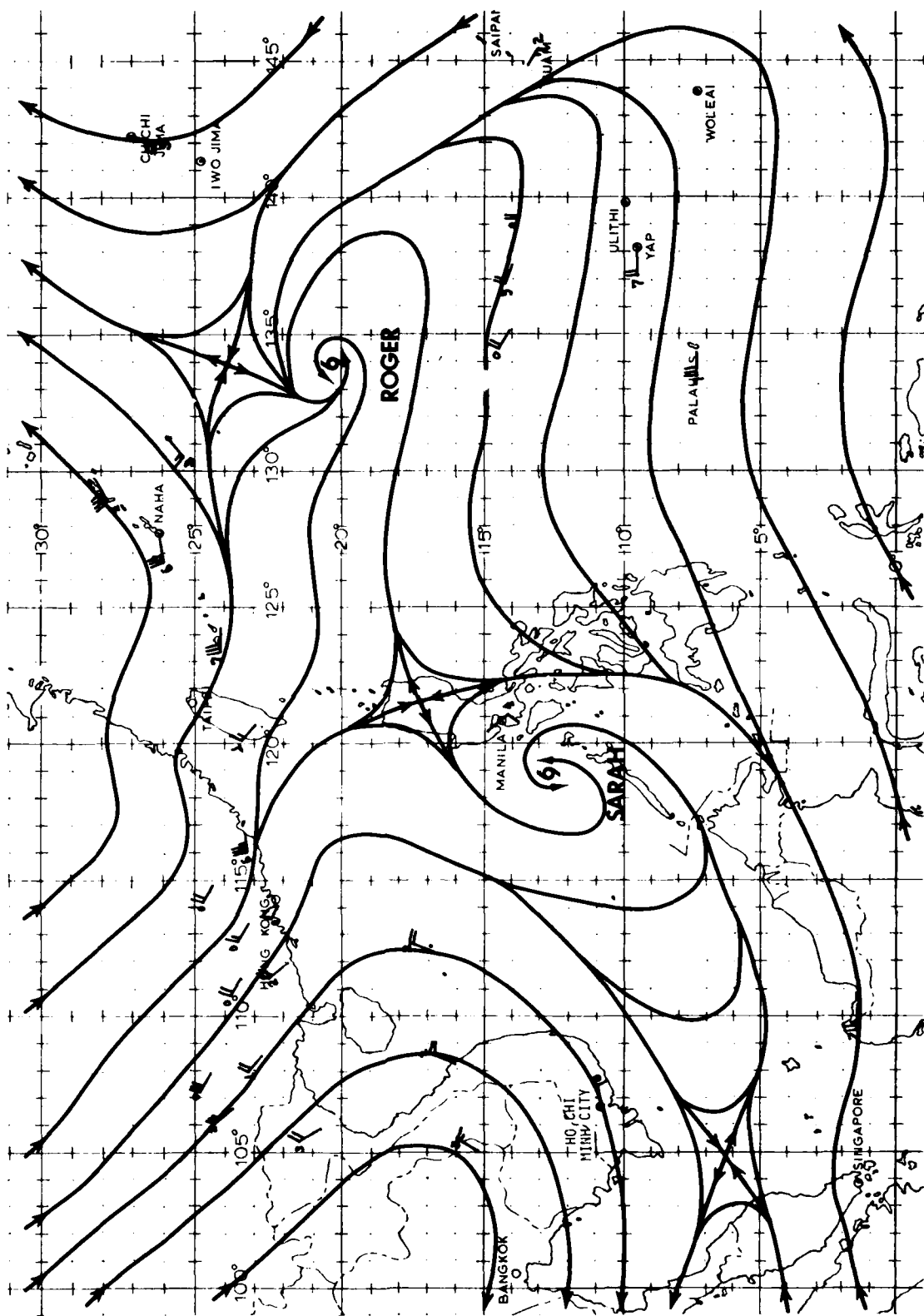
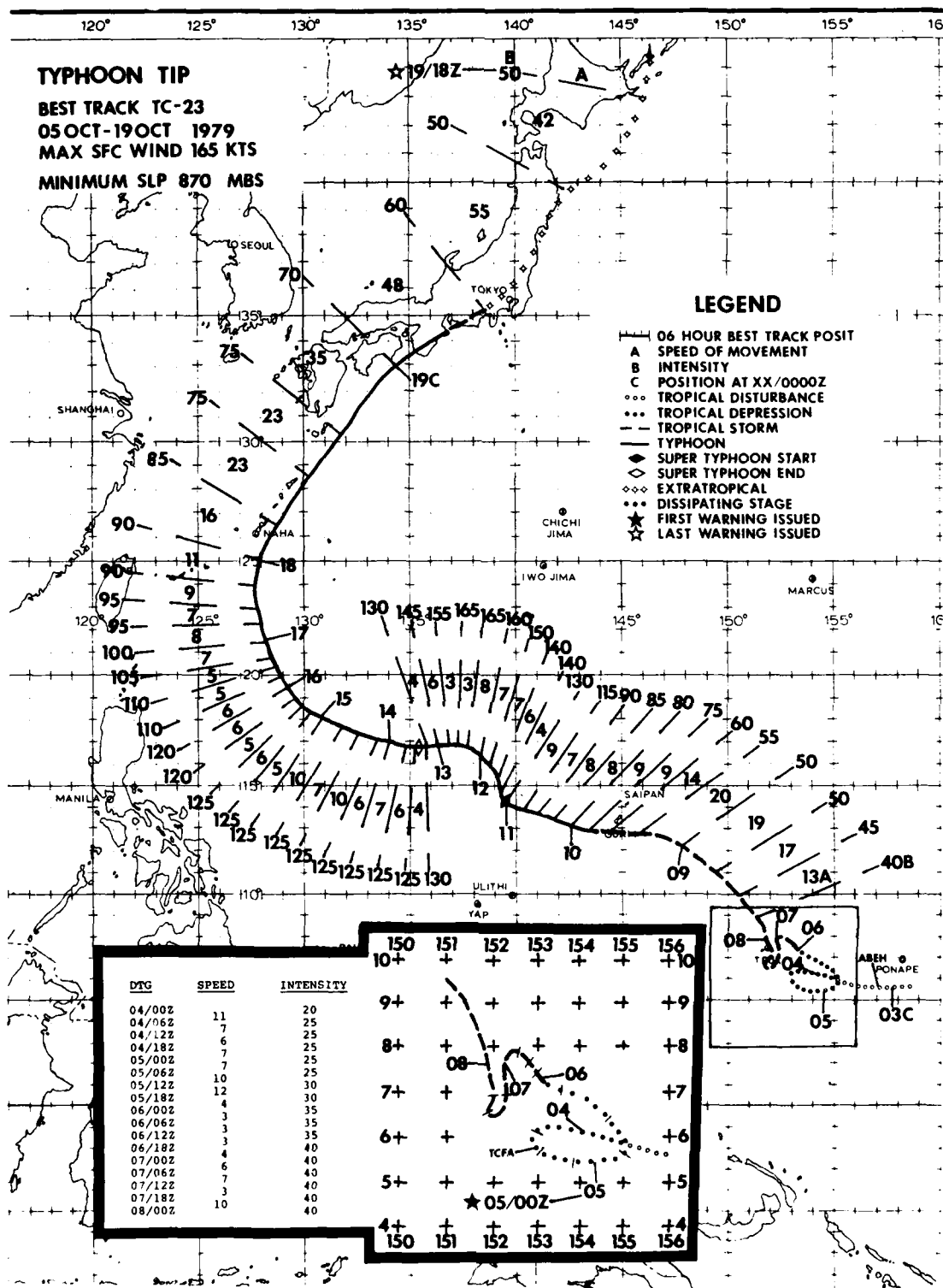


FIGURE 3-22-2. The 050000Z October 1979 500 mb streamline analysis. Wind speeds are in knots.



Super Typhoon Tip was the most significant typhoon of the 1979 season, and possibly the most significant tropical cyclone this century. Forty aircraft reconnaissance missions were flown on Tip, which produced 60 fixes, and thus made it one of the most closely watched cyclones in recent memory. Aircraft and synoptic data showed that Tip achieved the lowest sea-level pressure ever observed in a tropical cyclone (870 mb) and also had the largest circulation pattern on record (nearly 1200 nm (2222 km) in diameter).

Satellite and synoptic data during the early part of October revealed an active monsoon trough that extended from the Marshall Islands through the Caroline Islands to Luzon. Three distinct circulations developed in this trough: One near Manila, which would become Typhoon Sarah; another southwest of Guam, which would become Tropical Storm Roger; and the last between Truk and Ponape, which was destined to become Super Typhoon Tip.

It is not possible to discuss the development of Tip without, at the same time, examining the development of TS Roger. The surface analysis for 030000Z showed the three circulations in the monsoon trough with strong cross-equatorial flow, most of which was feeding into TS Roger. This situation was enhanced, in part, by an extratropical trough north of Roger over Southern Japan. The split in the surface flow pattern near Guam tended to keep Tip from developing rapidly while southeast of Guam. The upper-level analysis at the same time showed a large anticyclone north of Guam in close association with TS Roger and a developing TUTT cell about 300 nm (556 km) east of Marcus Island. The TUTT cell was moving slowly westward. Only strong upper-level northeasterlies existed over Truk and Ponape.

The satellite signature of the tropical disturbance near Truk continued to show improvement despite the initially unfavorable upper-air pattern. A Tropical Cyclone Formation Alert was issued at 040900Z, when a reconnaissance aircraft found a closed surface circulation about 120 nm (222 km) southeast of Truk with a MSLP of 1003.9 mb and a maximum observed surface wind of 25 kt (13 m/sec).

A reconnaissance aircraft fixed the disturbance the following day about 100 nm (185 km) southeast of the previous position. Based on indications of continual development, the first warning on TD 23 was issued at 050000Z. Although the surface pressure did not drop significantly, the observed surface winds did increase, and as a result, TD 23 was upgraded to Tropical Storm Tip at 060000Z.

During the period from 050000Z to 071800Z, TS Tip gave the JTWC forecasters a striking example of what the term "erratic movement" really means. TS Tip first executed a cyclonic loop southeast of Truk, then accelerated to the northwest, only to stall and meander to a position south of Truk. It was difficult to keep track of

TS Tip's surface position during this period. The best track is based almost entirely on aircraft surface positions, because the satellite fixes were based on upper-level outflow centers, and even the 700 mb center, as observed by aircraft reconnaissance, was considerably displaced from the surface center. Changes in the surface wind direction reported by Truk assisted JTWC in monitoring TS Tip during this period of erratic behavior.

Post-analysis shows that Tip's slow development and early erratic behavior are related to the weak, yet extensive circulation patterns that were associated with TS Roger. While near Truk, TS Tip was still competing with TS Roger for strong southerly surface inflow and, until the 8th, was coming out second best. During the period of erratic movement, JTWC continued to forecast a northwestward track with passage south of Guam. These forecasts were based primarily on the mid-level steering winds observed at Guam and obtained by the reconnaissance aircraft. These fairly strong winds were from the southeast and were expected to steer Tip toward Guam. However, at this stage of development, Tip was evidently too far south of this wind band and the steering in the immediate vicinity of Tip remained weak.

On 8 October, the expected northwest movement began. Roger was far to the north becoming extratropical, and the southerly winds that had been flowing north began to veer toward Tip. The TUTT cell earlier near Marcus Island migrated to a position northwest of Guam, affording Tip an excellent outflow channel to the north. Synoptic and subsequent aircraft data revealed that the southeasterly mid-level winds finally began to influence TS Tip, and the 080208Z aircraft fix confirmed that Tip was heading toward Guam at approximately 13 kt (24 km/hr). The minimum sea level pressure dropped to 995 mb and surface winds were 40 kt (21 m/sec).

Tropical Storm Tip continued to intensify and accelerate, eventually to 20 kt (37 km/hr) as he headed toward Guam. Until 6 hours before reaching Guam, Tip's persistence track and JTWC's forecasts indicated that he would pass directly over the center of the island. Six hours before expected landfall, however, reconnaissance aircraft and radar positions from Andersen AFB showed that TS Tip had turned to the west. Tip actually passed south of Guam, reaching CPA at about 25 nm (46 km) south of the southern end of the island at 091015Z. Maximum winds of 48 kt (25 m/sec) with gusts to 64 kt (33 m/sec) were recorded at the Naval Oceanography Command Center on Nimitz Hill. Andersen AFB recorded 6.5 inches of rain between 081800Z and 091800Z, and an additional 2.61 inches between 091800Z and 091900Z.

Shortly after passing Guam, Tip reached typhoon strength and continued on a basic west-northwest track. The analyses over the next few days showed that Typhoon Tip was moving into an area of strong upper-level divergence which appeared to cover most of

the western Pacific. Rapid intensification was forecast based upon the favorable upper-level pattern and the continued drop in surface pressure as observed by the reconnaissance aircraft. Intensification was much more rapid than expected, however, as the pressure between the 9th and the 11th dropped 98 mb to 898 mb. Tip reached super typhoon strength at that time with maximum winds of 130 kt (67 m/sec) reported by aircraft reconnaissance. The surface analyses revealed that the circulation pattern associated with Typhoon Tip had increased to a diameter of 1200 nm (2222 km) which broke the previous record of 720 nm (1333 km) set by Typhoon Marge in August 1951.

Super Typhoon Tip intensified still further, and at 120353Z, a reconnaissance aircraft recorded the lowest sea-level pressure ever observed in a tropical cyclone: 870 mb. This was 6 mb lower than the previous record set by Super Typhoon June in November 1975. The 700 mb height was 1944 meters and the 700 mb temperature within the eye was an exceptionally high 30° C (Fig. 3-23-1). The Aerial Reconnaissance Weather Officer (ARWO) on that particular mission remarked that "...one unusual feature was the spiral striations on the wall cloud. It looked like a double helix spiraling from the base of the wall cloud to the top, making about two revolutions in

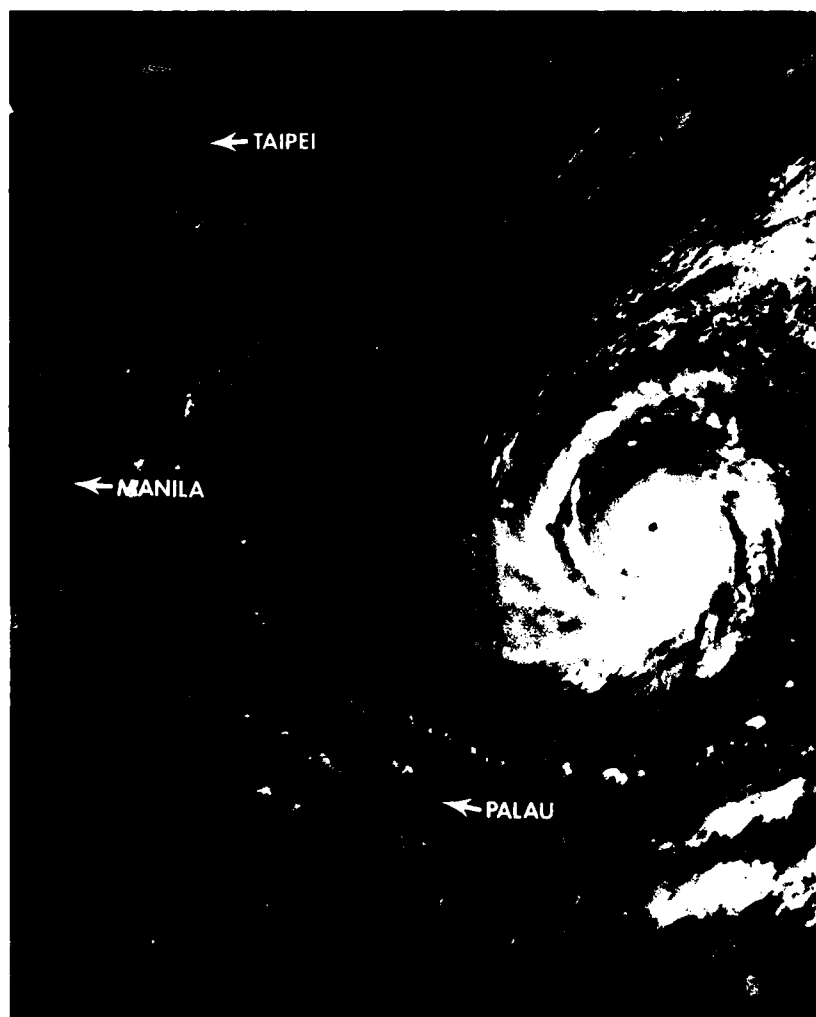


FIGURE 3-23-1. Super Typhoon Tip shortly before the record MSLP of 870 mb was observed by reconnaissance aircraft, 12 October 1979, 0012Z. (DMSF imagery).

climbing.<sup>1</sup> Tip maintained super typhoon strength for the next 54 hours while moving to the northwest at between 3 and 7 kt (6 and 13 km/hr). Estimated maximum wind intensity of 165 kt (85 m/sec) was reached at 120600Z.

The immense circulation pattern associated with Typhoon Tip extended from the surface through 500 mb (and probably higher) and essentially split the subtropical mid-tropospheric ridge south of Japan. This would have allowed an average typhoon to recurve sharply to the north, but Tip was an atypical system and the northwestward movement persisted for the next three days.

Steering forecast aids were useless during this period because they merely steered Tip in his own large storm-induced flow. Persistence and climatology became the primary forecast aids during this stage in Tip's life.

From the 13th to the 17th, the radius of surface and gradient-level 30 kt (15 m/sec) or greater winds extended over 600 nm (1111 km) from Typhoon Tip's center. The radius of over 50 kt (26 m/sec) winds was over 150 nm (278 km) (Fig. 3-23-2). The aircraft reconnaissance data likewise showed that 700 mb winds of 105 kt (54 m/sec) existed more than 120 nm (222 km) from Tip's center during this period (Fig. 3-23-3).

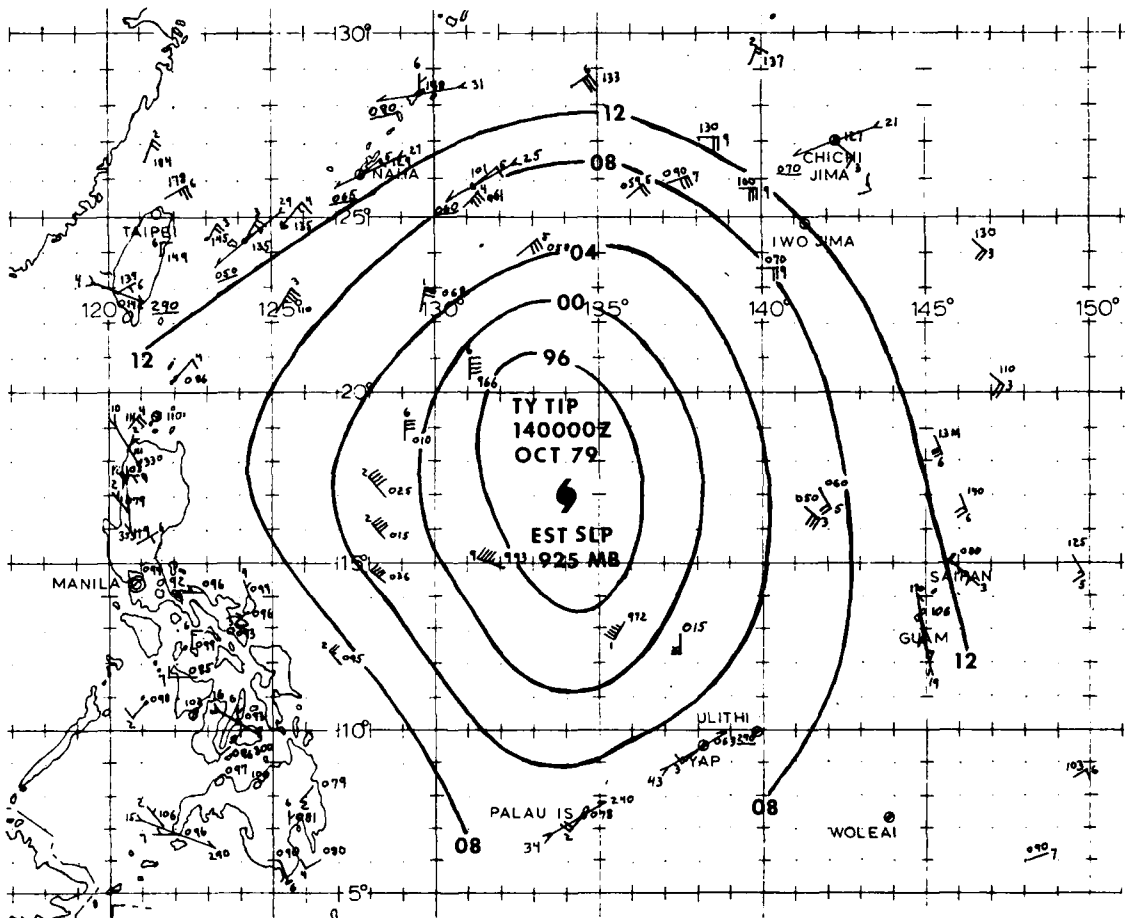


FIGURE 3-23-2. The 140000Z October 1979 surface (—) / gradient-level (ddd) wind data and pressure analysis in the vicinity of Super Typhoon Tip. Wind speeds are in knots.

<sup>1</sup>PATRICK W. GIESE, Capt, USAF: Mission ARWO.

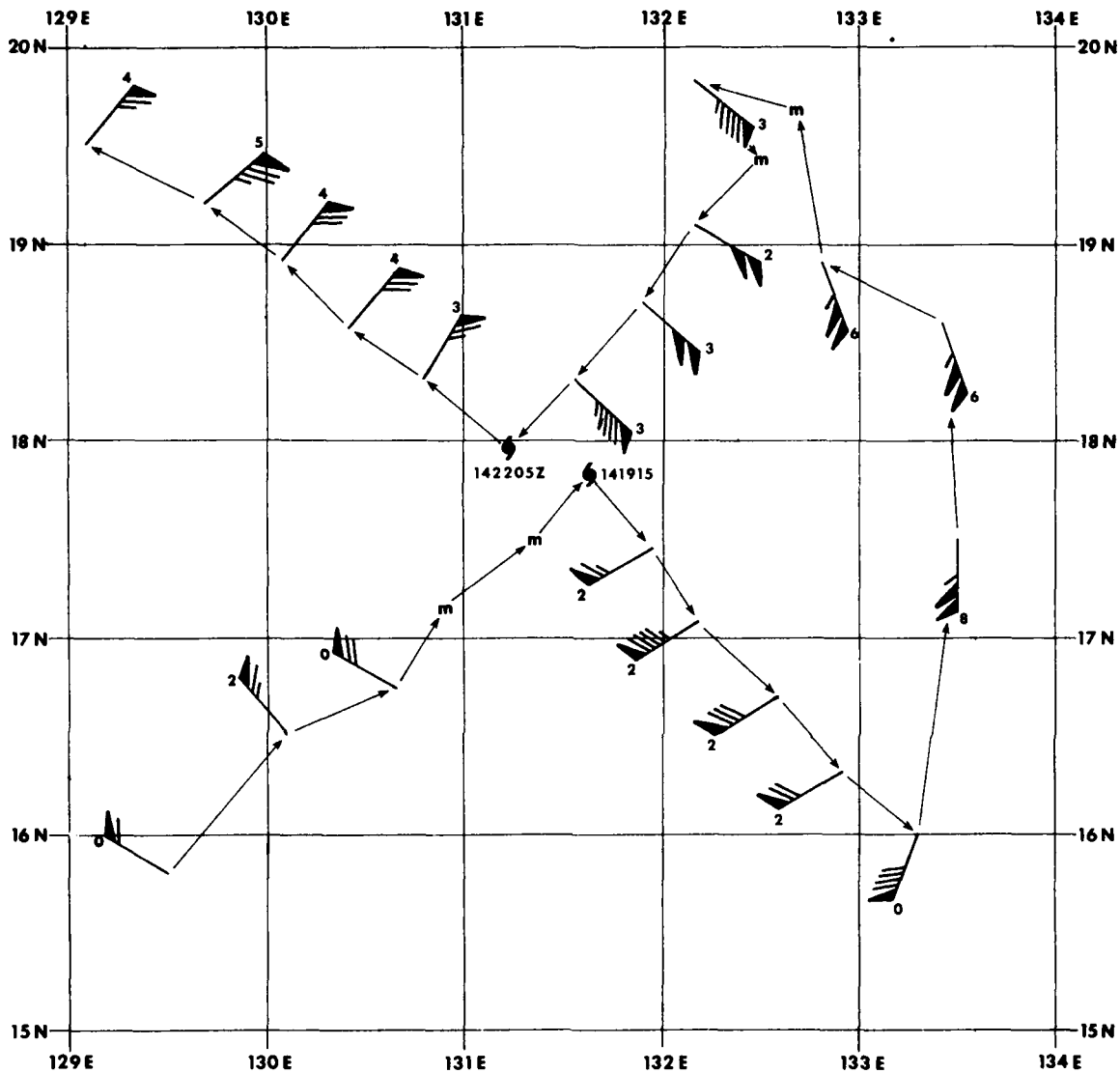


FIGURE 3-23-3. Plot of aircraft reconnaissance data from the 26th mission into Super Typhoon Tip on 15 October 1979. Tip's positions were fixed at 141915Z and 142205Z. Wind barbs are the measured 700 mb winds. The tens digit of the wind direction is also plotted with the wind barbs. An "m" indicates no 700 mb wind data available.

After the 17th, Tip began to weaken as the large circulation pattern began to shrink. This, together with the effects of a mid-level trough moving toward Japan from China, caused Tip to begin tracking northward. By the 18th, he was accelerating to the northeast under the influence of the increased mid-level southwesterlies.

During recurvature, Tip passed within 35 nm (65 km) of Kadena AB on Okinawa, which reported maximum sustained winds of 38 kt (20 m/sec) with gusts to 61 kt (31 m/sec).

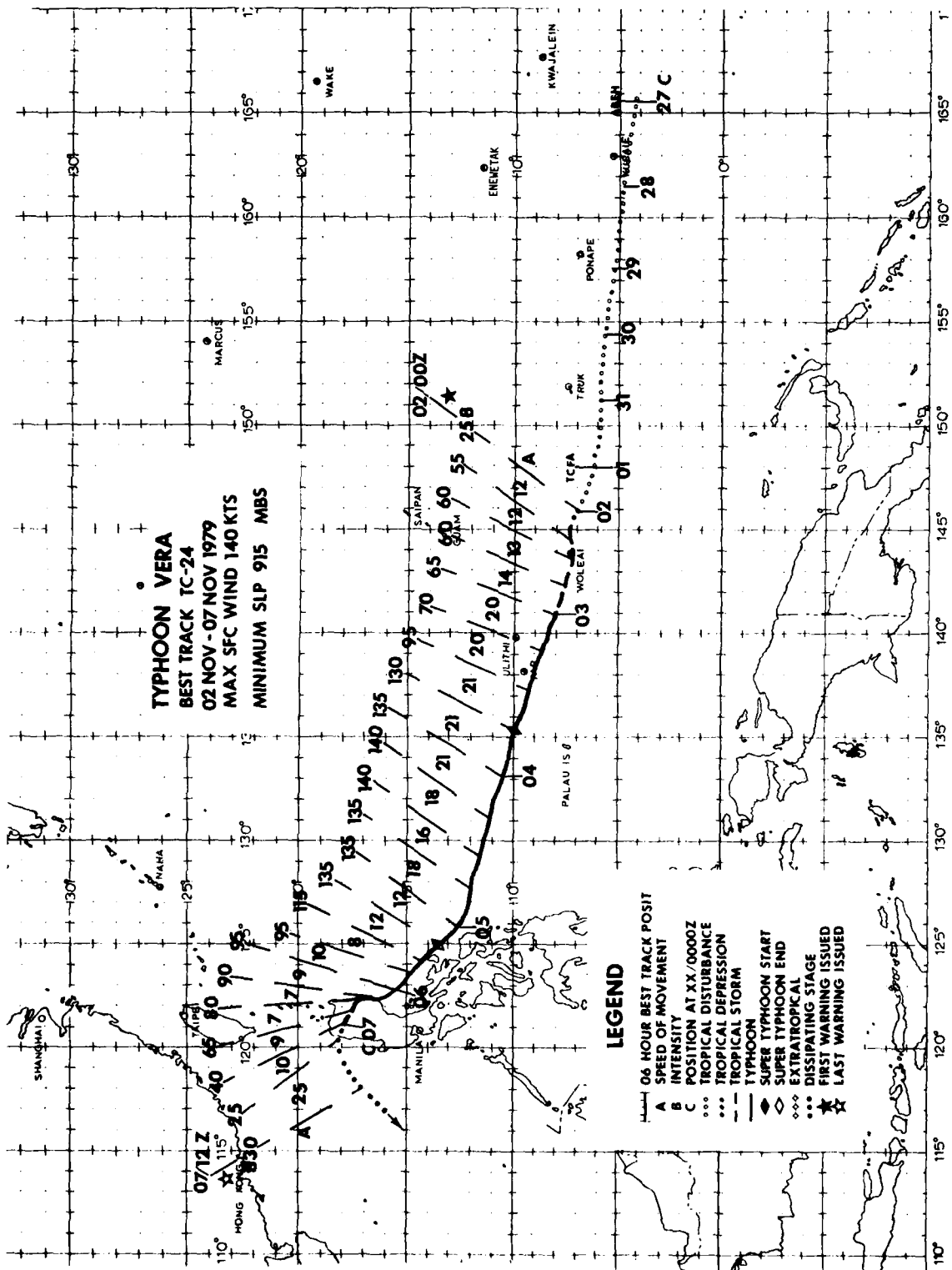
At approximately 190100Z, after reaching a forward speed of between 35 and 45 kt (65 and 83 km/hr), Typhoon Tip, with maximum winds of 70 kt (36 m/sec), made landfall on the Japanese island of Honshu, about 60 nm (111 km) south of Osaka. Synoptic and radar data from stations on the island showed that Tip maintained a speed in excess of 45 kt (83 km/hr) as he passed to the north of Tokyo and eastward into the Pacific Ocean. According to satellite imagery, Tip completed extratropical transition over Honshu.

The extratropical low pressure center (the remnants of Tip) maintained winds of storm force, 48 kt (25 m/sec), until the 21st when it moved to a position east of Kamchatka and finally began to fill rapidly.

The majority of the severe damage occurred in Japan where the agricultural and fishing industries sustained losses into the millions of dollars. Flooding from Tip's rains also breached a fuel retaining wall at Camp Fuji, west-northwest of Yokosuka. The fuel caught fire causing 68 casualties, including 11 deaths, among the U.S. Marines stationed there.

Considering the size and strength of Super Typhoon Tip, the Western Pacific fared well. Luckily, the maximum intensity was reached while the system was still far from any inhabited areas. The potential for mass destruction was always there, but from a strictly meteorological standpoint, Tip was also a thing of great beauty. One of the Aerial Reconnaissance Weather Officers stated, shortly after she returned from a mission, that "...the second penetration was beyond description. This is unquestionably the most awe-inspiring storm I have ever observed. In the 24 hours that transpired between the first and second fixes, the moon had risen sufficiently to shine into the eye through an 8 nm clear area at the top of the eyewall. To say it was spectacular is totally inadequate...'awesome' is a little closer."<sup>1</sup>

<sup>1</sup>CAROL L. BELT, 1LT, USAF: Mission ARWO.



# SUPER TYPHOON VERA (24)

Vera, the fourth and final super typhoon of 1979, originated in an active near-equatorial trough (NET) which extended through the Caroline and Marshall Islands. Vera was first analyzed as a weak surface circulation 100 nm (185 km) southeast of Ponape on 27 October and was included on JTWC's Significant Tropical Weather Advisory (ABEH PGTW) for the next 4 days as it remained in the NET. Low-level inflow during this period was split between several weak eddies.

By 300000Z, synoptic data indicated that the low-level inflow was now concentrated into the developing cyclone. Meanwhile, the convective activity increased rapidly over a 24-hour period from 310000Z to 010000Z. A Tropical Cyclone Formation Alert was issued at 010000Z November based on increased upper-level outflow and a continued decrease in surface pressure.

Aircraft reconnaissance at 012100Z found an ill-defined circulation center with a central pressure of 1004 mb and estimated surface winds of 15 kt (8 m/sec). Numbered warnings began at 020000Z based on an improved satellite signature. Rapid intensification occurred, and TD 24 was upgraded to Tropical Storm Vera 6 hours later. Vera continued to intensify, reaching typhoon strength by 0000Z on 3 November while 190 nm (352 km) south-southeast of Yap. At this time, the 200 mb analysis revealed that a large upper-level anticyclone, previously located northwest of Vera at 010000Z, was weakening and was no longer restricting Vera's outflow to the north. By 020000Z, the anticyclone situated over Vera had become the dominant upper-level synoptic feature over the western Pacific.

From the time of the first warning until her approach to the Philippines northeast of Samar, Vera moved on a virtually straight west-northwest track. The major influence on her movement was the unusually strong mid-tropospheric subtropical ridge over the western Pacific. The strength of the easterly current south of the ridge steered Vera at forward speeds of 20 to 22 kt (37 to 41 km/hr)--almost twice the climatological average--as she passed 35 nm (65 km) south of Yap. As a result, although JTWC's forecast tracks were consistent and accurate, forecast forward speeds lagged behind Vera's actual speeds. The underestimates were considerable during the early stages of acceleration.

Vera continued to intensify during her west-northwestward acceleration and reached super typhoon intensity only 18 hours after being upgraded to a typhoon. Reconnaissance aircraft reports indicated Vera maintained super typhoon strength for over 24 hours before weakening as she approached Catanduanes Island. The peak wind reported on Catanduanes Island was 50 kt (26 m/sec) at 051200Z as Vera passed just off the coast.

The island chain began restricting low-level inflow as Vera continued northwestward toward northern Luzon. Vera made landfall north of Tarigdig Point packing winds of 90 kt (46 m/sec).

After landfall, the onset of enhanced low-level northeasterly flow over the Taiwan Straits coupled with strong upper-level southwesterlies over the Philippines resulted in vertical disorganization and rapid weakening of Vera. Radar and aircraft reports indicated the low-level circulation continued to track northwestward over the Cagayan River valley and exit into the South China Sea near Culili Point south of Laoag. The upper-level circulation sheared off near Tuguegarao and was tracked using satellite imagery northward over Aparri then east-northeastward into the Philippine Sea. Surface synoptic and ship reports at 070000Z indicated that a secondary surface center existed near Baguio. At the same time, the primary center was crossing the Cordillera Central Mountain range 95 nm (176 km) to the north (Fig. 3-24-1).

After exiting into the South China Sea, the strong northeast monsoon flow accelerated Vera southwestward, and the final warning was issued at 1200Z on the 7th downgrading Vera to a tropical depression.

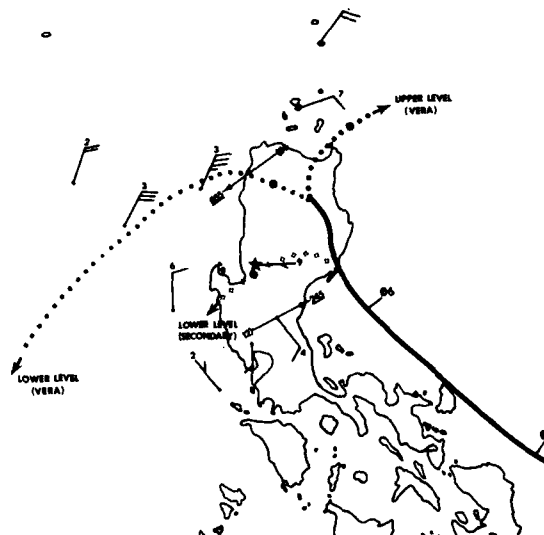
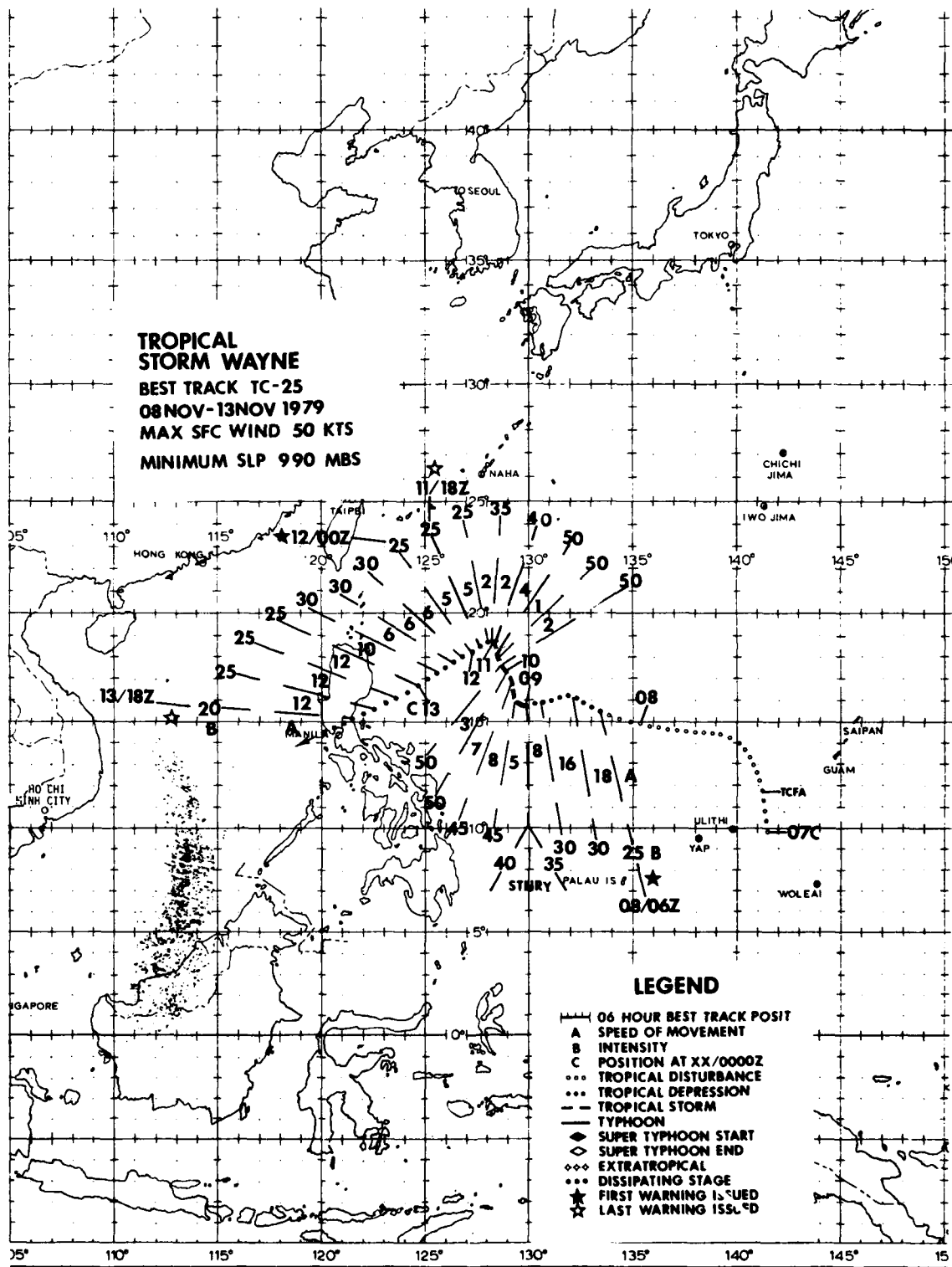


FIGURE 3-24-1. Tracks of low-level and upper-level centers after the upper-level sheared off over northern Luzon. Synoptic and ship reports at 070000Z November indicate secondary low-level center near Baguio (WMO 98328) (indicated by a star). The 070000Z center positions are indicated by solid dots. Wind speeds are in knots.



# TROPICAL STORM WAYNE

Tropical Storm Wayne was first detected as a mid-level circulation on satellite imagery in early November. Figure 3-25-1 shows the broad cloud structure associated with the system. Aircraft reconnaissance around this period showed that the disturbance was most developed at mid-levels. Wayne moved northward initially and began developing a more definitive surface circulation which became evident in synoptic data on 7 November. Wayne lasted only a relatively short time, but he still proved to be one of the more difficult storms to forecast for 1979.

JTWC's first forecasts called for recurvature. They were based on the 080000Z November 500 mb synoptic situation which showed a weakness in the subtropical ridge with westerlies extending south to 23°N latitude. Steering flow at all levels, however, was not consistent and strong low-level easterlies prevented Wayne from recurving toward the east. On 9 November, an extratropical system with accompanying surface frontogenesis developed north of Wayne. This caused a break in the otherwise persistent easterly flow and Wayne began to track northward. JTWC forecasts again reflected recurvature and called for early dissipation due to the strong shear from low-level easterlies and upper-level westerlies. The extratropical system moved rapidly eastward bypassing Wayne. By 11 November, strong northeasterlies had once again been established, and Wayne turned back to the west, ultimately, tracking west-southwest toward the central

Philippines. At the same time, strong shear did weaken Wayne as it tracked toward the Philippines (Figure 3-25-2) and dissipation occurred as he made landfall over Luzon.

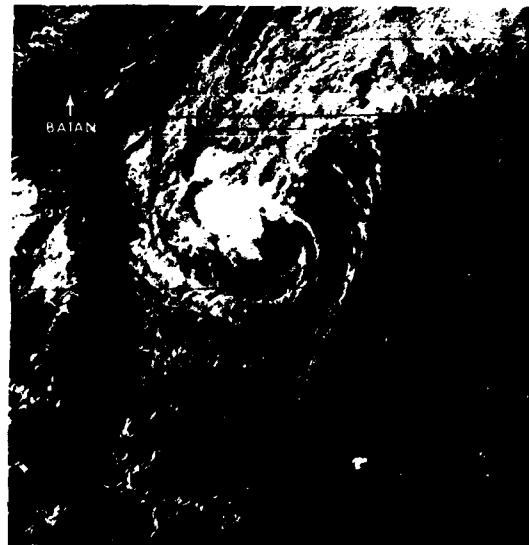


FIGURE 3-25-2. Tropical Storm Wayne weakening due to strong shear as it approached the Philippines, 12 November 1979, 0100Z. (DMSP imagery)

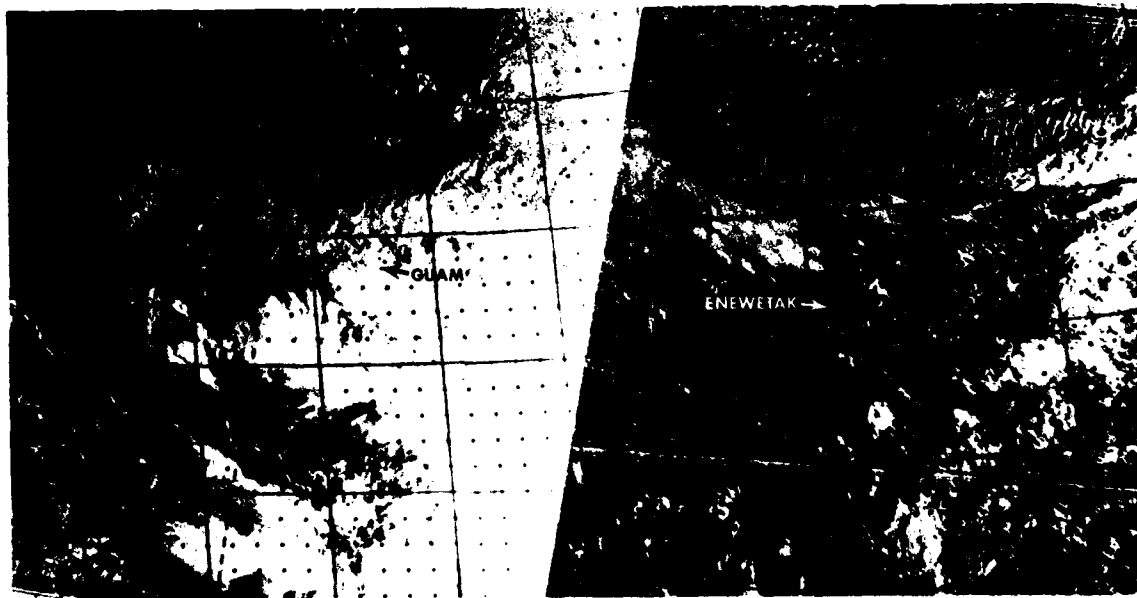
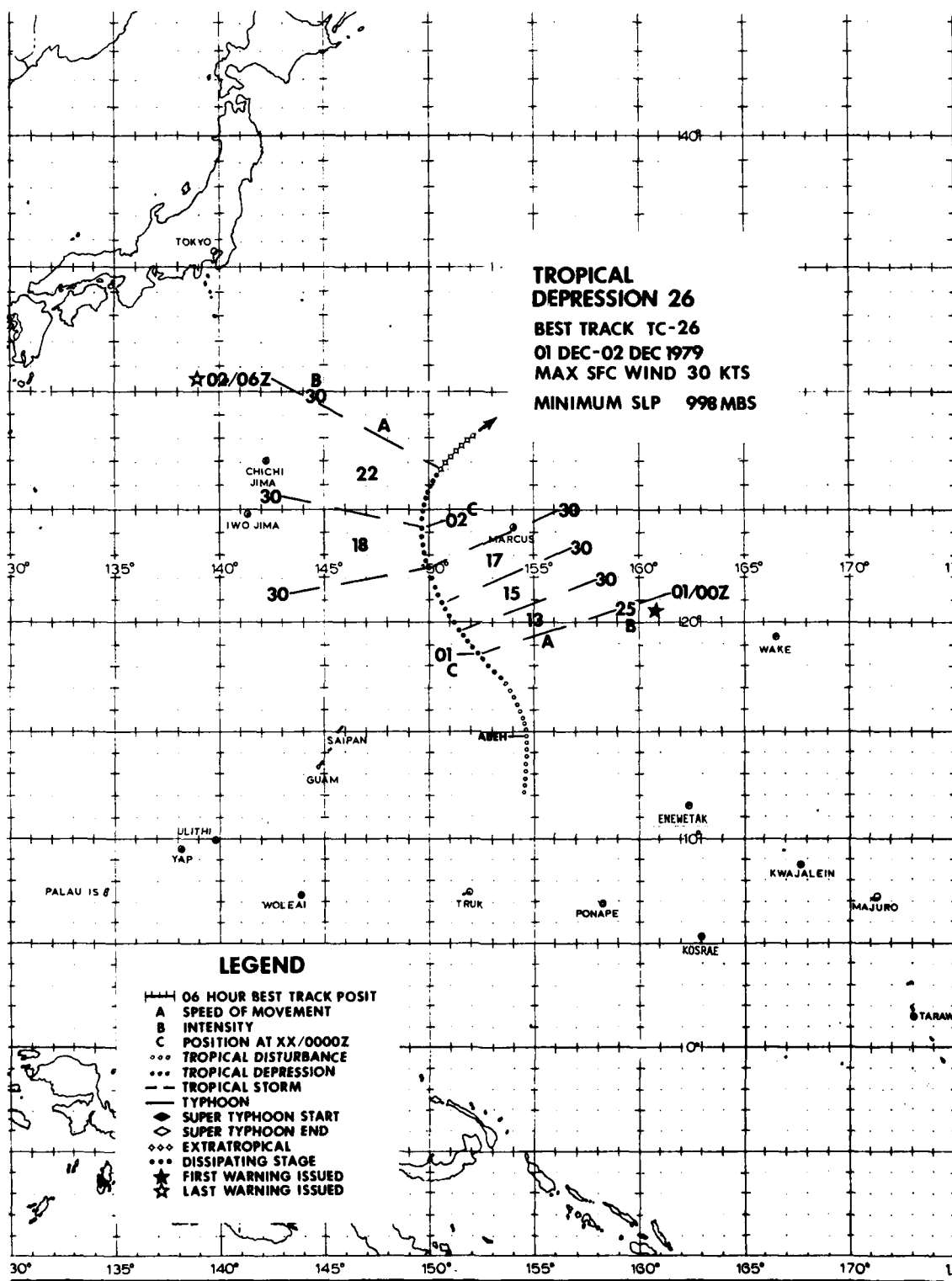


FIGURE 3-25-1. Disturbance stage of Tropical Storm Wayne when the system was mainly a mid-level circulation, 6 November 1979, 1208Z. (DMSP imagery)



# TROPICAL DEPRESSION 26

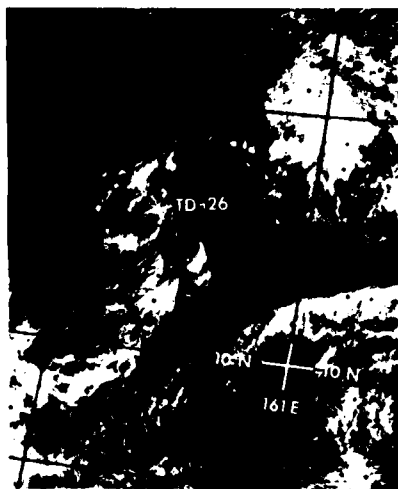


FIGURE 3-26-1. Tropical Depression 26 developed north-northeast of the Truk Islands and appeared to be the surface reflection of a mid-level circulation. Surface data suggest the existence of a weak circulation 400 nm (741 km) northeast of Tropical Depression 26 and a broad circulation (Typhoon Abby) to the southeast, 29 November 1979, 2255Z. (DMSP imagery)

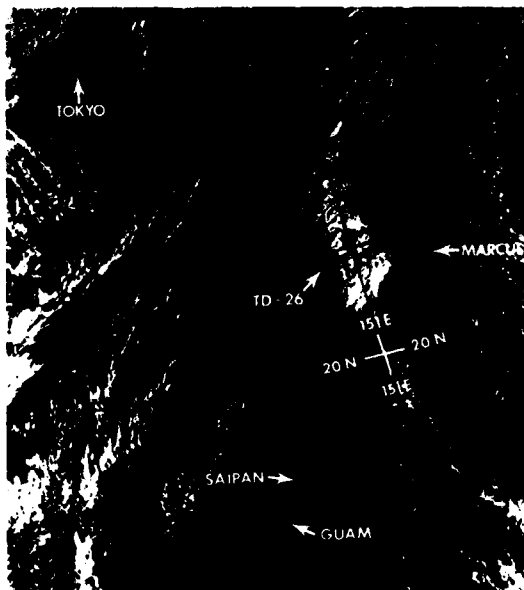


FIGURE 3-26-3. Tropical Depression 26 passed west of Marcus Island and merged with an extratropical frontal boundary. Tropical Depression 26 sheared in the vertical with the low-level exposed surface circulation remaining on the western edge of the convection, 2 December 1979, 0036Z. (DMSP imagery)

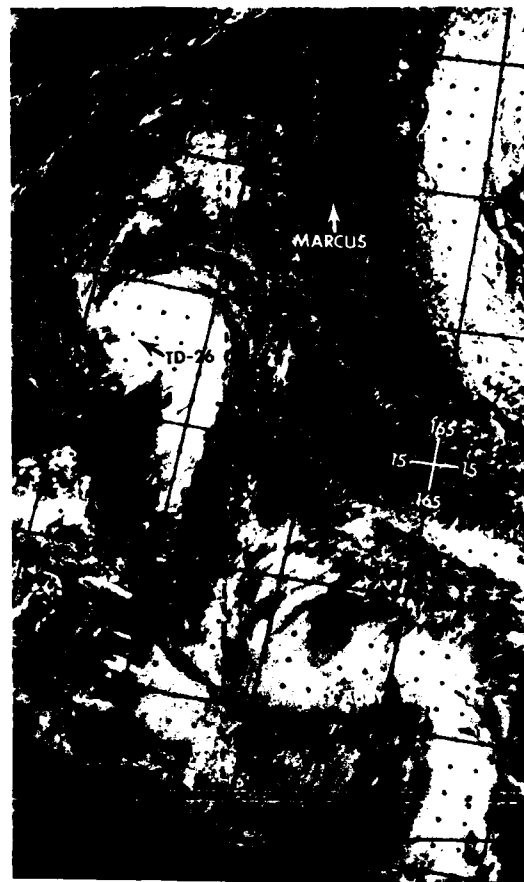
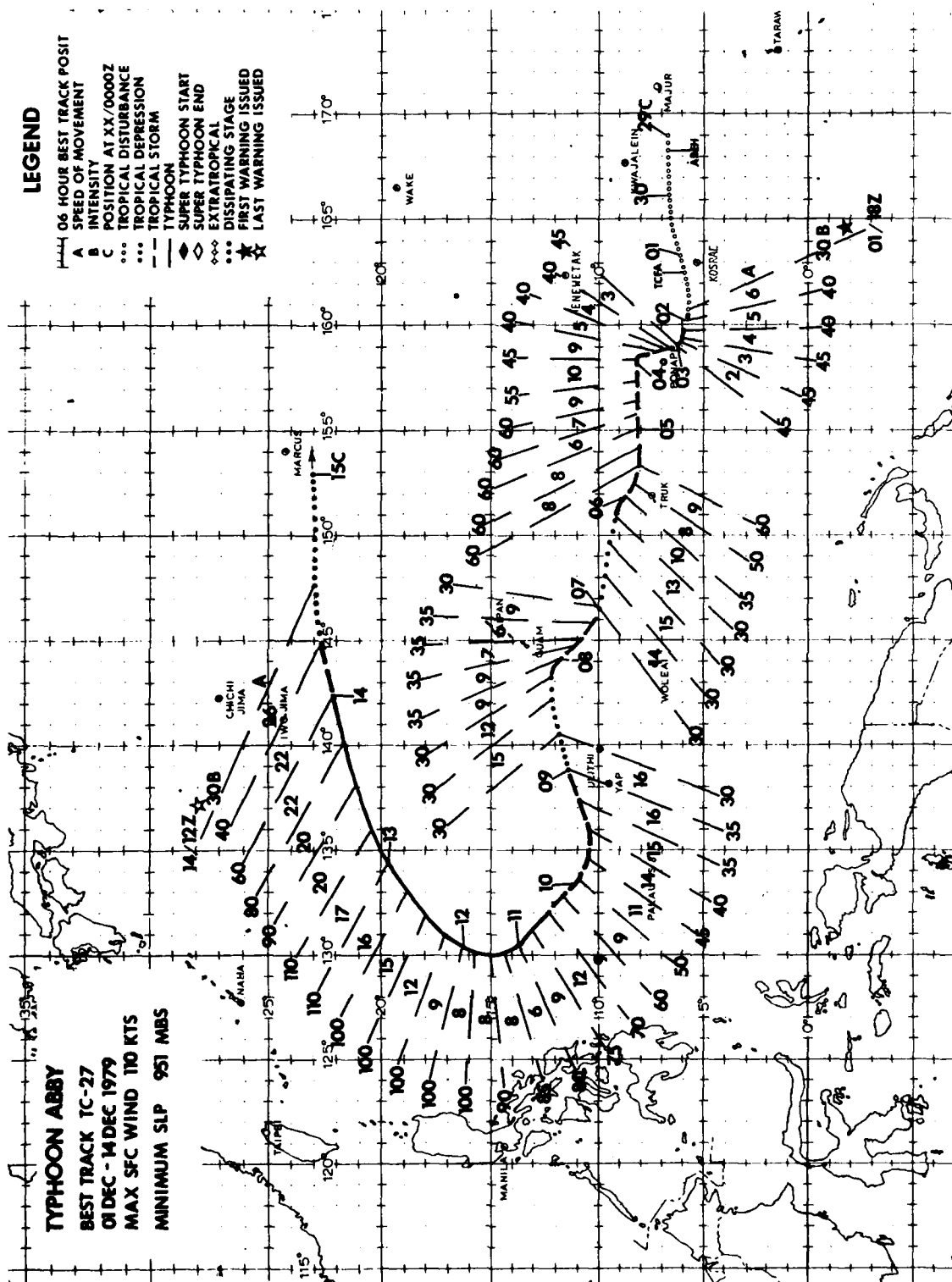


FIGURE 3-26-2. Tropical Depression 26 developed an identifiable surface circulation and intensified as it tracked north-northwestward. A ship, transiting the area, passed through the storm center and reported 35 kt (18 m/sec) winds in heavy showers. Based on synoptic data, the first warning was issued on Tropical Depression 26, but 35 kt-or-greater winds were never reported again. This photo shows Tropical Depression 26 at its maximum convective intensity, 30 November 1979, 2237Z. (DMSP imagery)

06 HOUR BEST TRACK POSITION  
A SPEED OF MOVEMENT  
B INTENSITY  
C POSITION AT XX/0000Z  
--- TROPICAL DISTURBANCE  
--- TROPICAL DEPRESSION  
--- TROPICAL STORM  
--- TYPHOON  
◆ SUPER TYPHOON START  
◇ SUPER TYPHOON END  
----- EXTRATROPICAL  
----- DISSIPATING STAGE  
★ FIRST WARNING ISSUED  
★ LAST WARNING ISSUED

**MINIMUM SLP 951 MBS**



Abby, the last typhoon of the 1979 season, developed over the Marshall Islands during early December. Abby proved to be an unusual cyclone in several ways. Throughout much of Typhoon Abby's existence, Abby was not vertically aligned. Aircraft reconnaissance located the mid-level circulation center displaced as much as 55 nm (102 km) from the surface center. At one point, two centers were identified; a point to be discussed later. In addition, Abby fluctuated between tropical depression and tropical storm strength several times before reaching typhoon strength 10 days after formation.

Within 24 hours of the first warning, aircraft reconnaissance observed surface winds of 45 kt (23 m/sec) and a sea-level pressure of 996 mb. The surface and 700-mb centers were displaced by 12 nm (22 km). Abby continued to intensify to 60 kt (31 m/sec) on 4 October while increasing the displacement between the surface and 700-mb centers.

Abby deviated from a westward track to a north-northwestward track on 3 December with a reduced forward speed of movement. The temporary northward movement was associated with a deepening mid-tropospheric trough which moved rapidly northeastward away from Japan on 1 December. Abby resumed a westward track with increased forward speed after the trough axis passed east of Abby late on the 3rd.

All available information (climatology, analog aids, analyses and numerical forecasts) indicated continued intensification as Abby tracked towards Guam. This expected intensification was reflected in JTWC warnings during this period. However, the opposite occurred. As Abby moved west of Truk, she weakened to less than tropical storm strength. An upper tropospheric anticyclone north of Abby restricted Abby's outflow and resulted in the observed weakening (Fig. 3-27-1). By 7 December, Abby reintensified to minimum tropical storm strength as she moved westward and away from the influence of the restricting anticyclone. Abby then tracked west-northwestward under the influence of a mid-tropospheric long-wave trough oriented along 142E. As the trough moved east of Abby, the subtropical mid-tropospheric ridge again built eastward, providing a mechanism which steered Abby towards the west-southwest. During the 8th, Abby once again weakened to less than tropical storm strength and increased her forward speed of movement.

Abby was not vertically aligned from the issuance of the first warning through the 9th. On the 9th, aircraft reconnaissance making a supplemental fix at 0617Z observed that Abby possessed multiple 700 mb centers. By the time of entry into Abby for a levied 0830Z fix, only one well organized, intensifying center was found. The following is a storm mission summary by the Aerial Reconnaissance Weather Officer (ARWO), who made the double penetration into Abby: "This mission started out as a normal fix but ended

up being unusual. On our way inbound for the supplemental fix, there was no problem reading winds at flight level or on the surface. Winds were 20-25 kt the entire way. An area of thunderstorm activity became visible ahead of us. As we neared it, the doppler indicated that the 700 mb center was in the middle of the thunderstorm. Not eager to go find this out, we went back to find the surface center. Enroute, we saw surface winds in excess of 35 kt which led us to a fairly disorganized surface center just east of the main thunderstorm. There was a fairly small light and variable wind center. Radar showed little curvature in the shower pattern, but the surface winds did indicate a weak circulation existed at this first position. No weather existed to the east of our first fix, and this position was right on the JTWC forecast track. At the second fix, things had changed. As we came in the second time, we encountered considerable precipitation. Doppler and search radar indicated a center with a possible wall cloud forming considerably west of our first fix. Winds were stronger at flight level and we penetrated a wall cloud of about 80% coverage. When we broke through, we encountered our strongest winds at flight level. The surface center was under the eastern wall cloud with a small light and variable wind center at 700 mb centered in the eye. Lightning started in the eastern wall cloud and spread around the

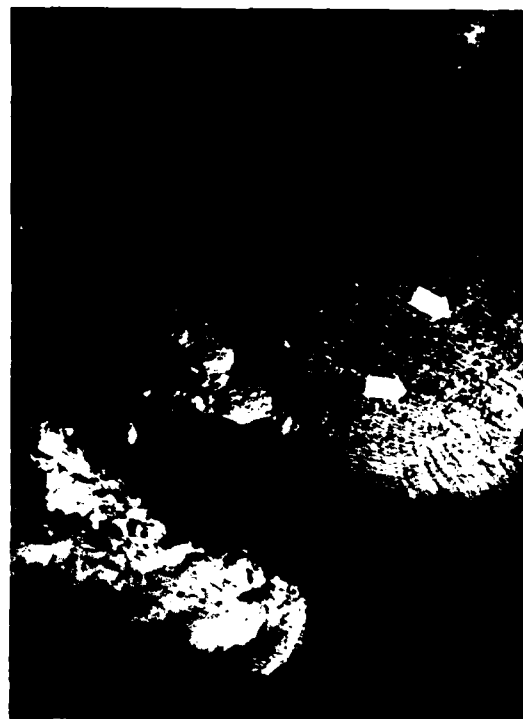


FIGURE 3-27-2. Typhoon Abby's two outflow centers are indicated by arrows, 9 December 1979, 0144Z. (DMSP imagery) Figure 3-27-1 is on next page.

FIGURE 3-27-1 is on following page.

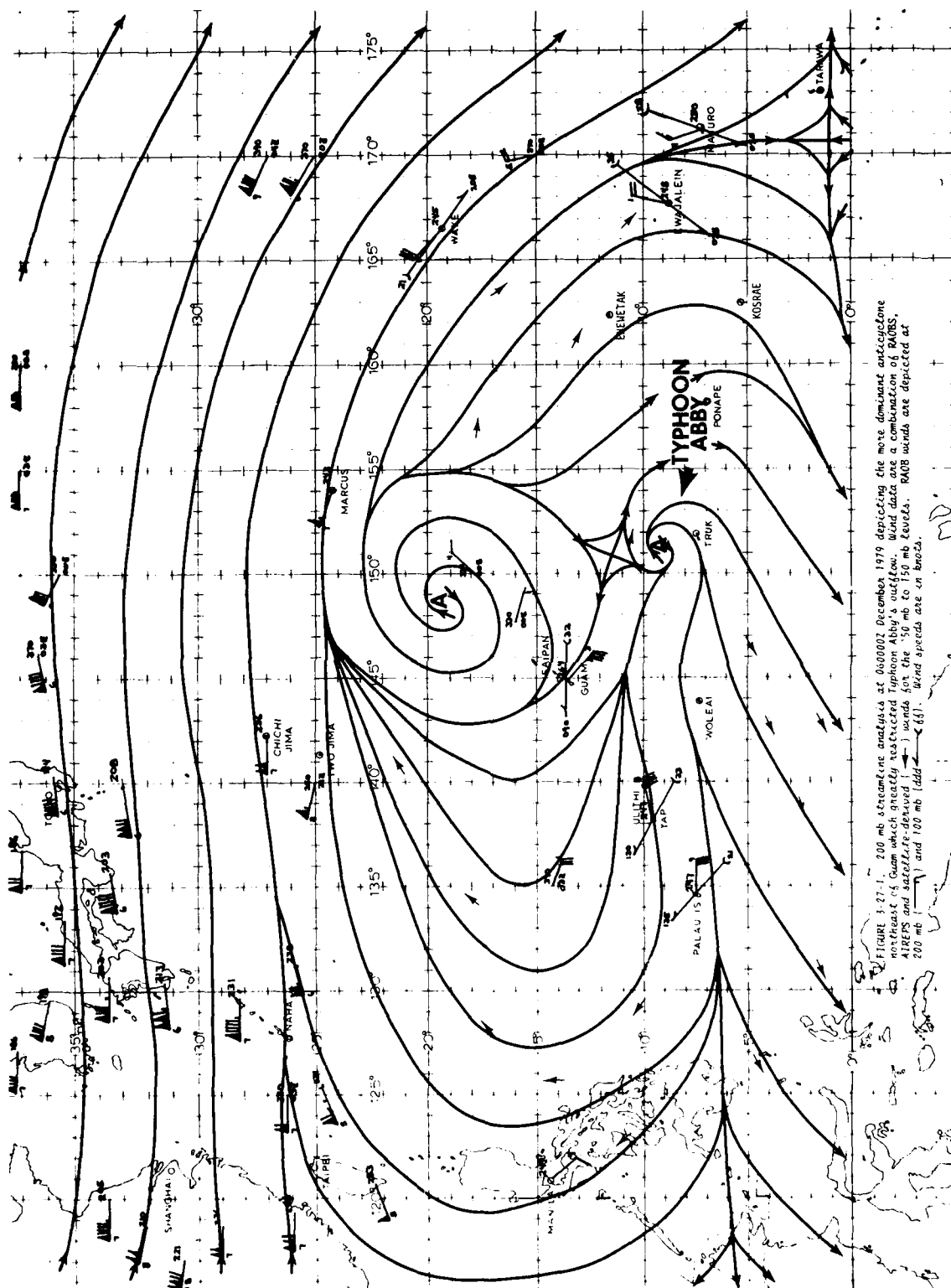


Figure 3-27-1. 200 mb streamlines and data at 000000Z December 1979 depicting the more dominant anticyclone northeast of Guam which greatly restricted Typhoon Abby's outflow. Wind data are a combination of RA00S, AIRS and satellite-derived (---) winds for the 50 mb to 150 mb levels. RA00S winds are depicted at 200 mb (---) and 100 mb (---). Wind speeds are in knots.

eye. Our drop was made as close to the surface center as was possible and indicated a good 988 mb sea-level pressure. The 700 mb height was down 72 meters from the first fix. The positions were 85 miles apart causing me to believe that two centers existed for a short time with the latter becoming the predominate one. The pressure profile seems to indicate this theory...."<sup>1</sup> Satellite imagery at 090144Z also indicated the possible existence of multiple outflow centers (Fig. 3-27-2). While Abby was reorganizing into a single center, she began to reintensify to tropical storm strength. By the 10th, Abby had attained typhoon strength which made her the last typhoon of the decade.

A mid-tropospheric short-wave trough moved from mainland China into the Sea of Japan and deepened on the 10th. In response to the short-wave trough, the subtropical mid-tropospheric ridge again receded eastward north of Abby. The interaction of these two synoptic features allowed Abby to again track northwest. On the 11th, Typhoon Abby recurved in response to another mid-tropospheric short-wave trough, which extended further south than the trough on the 10th. This last trough in the series moved into the northern part of the South China Sea and deepened, causing Abby to finally follow a recurvature track.

Typically, recurving typhoons have their maximum intensities either less than 12 hours after recurvature or prior to recurvature (Riehl, 1971). Abby, however, did not reach maximum intensity until 36 hours after recurvature. By 13 December, Typhoon Abby reached maximum intensity of 110 kt (57 m/sec) with a minimum sea-level pressure of 951 mb (Fig. 3-27-3). As Abby continued toward the east-northeast, she approached a regime of very strong westerlies in the middle-and upper-troposphere. The strong westerlies induced Abby's acceleration

and rapid weakening. Abby dissipated on the 14th due to strong vertical shear between the surface and middle levels.

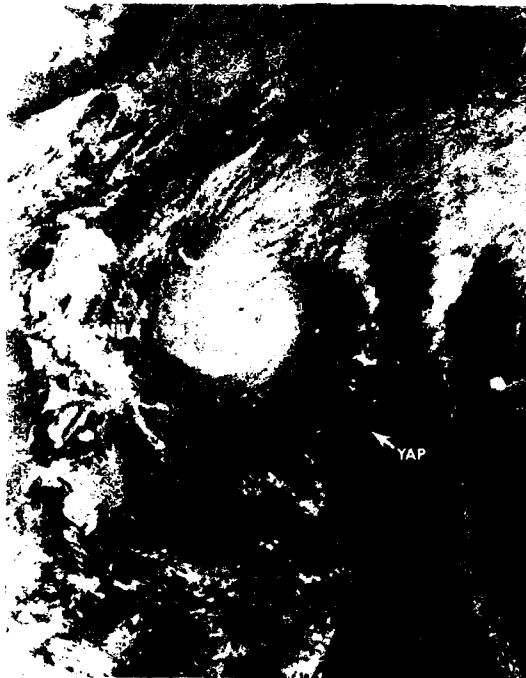


FIGURE 3-27-3. Typhoon Abby just after recurvature, 12 December 1979, 00:12. (DMSP imagery)

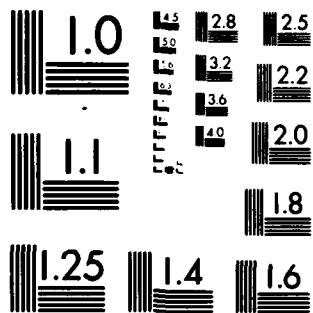
<sup>1</sup>CHARLES B. STANFIELD, Capt., USAF: MISSION ARWO.

NAVAL OCEANOGRAPHY COMMAND CENTER/JOINT TYPHOON WARNING--ETC F/G 4/2  
ANNUAL TYPHOON REPORT 1979.(U)  
1979 J W DIERCKS, J K LAVIN, J H BELL

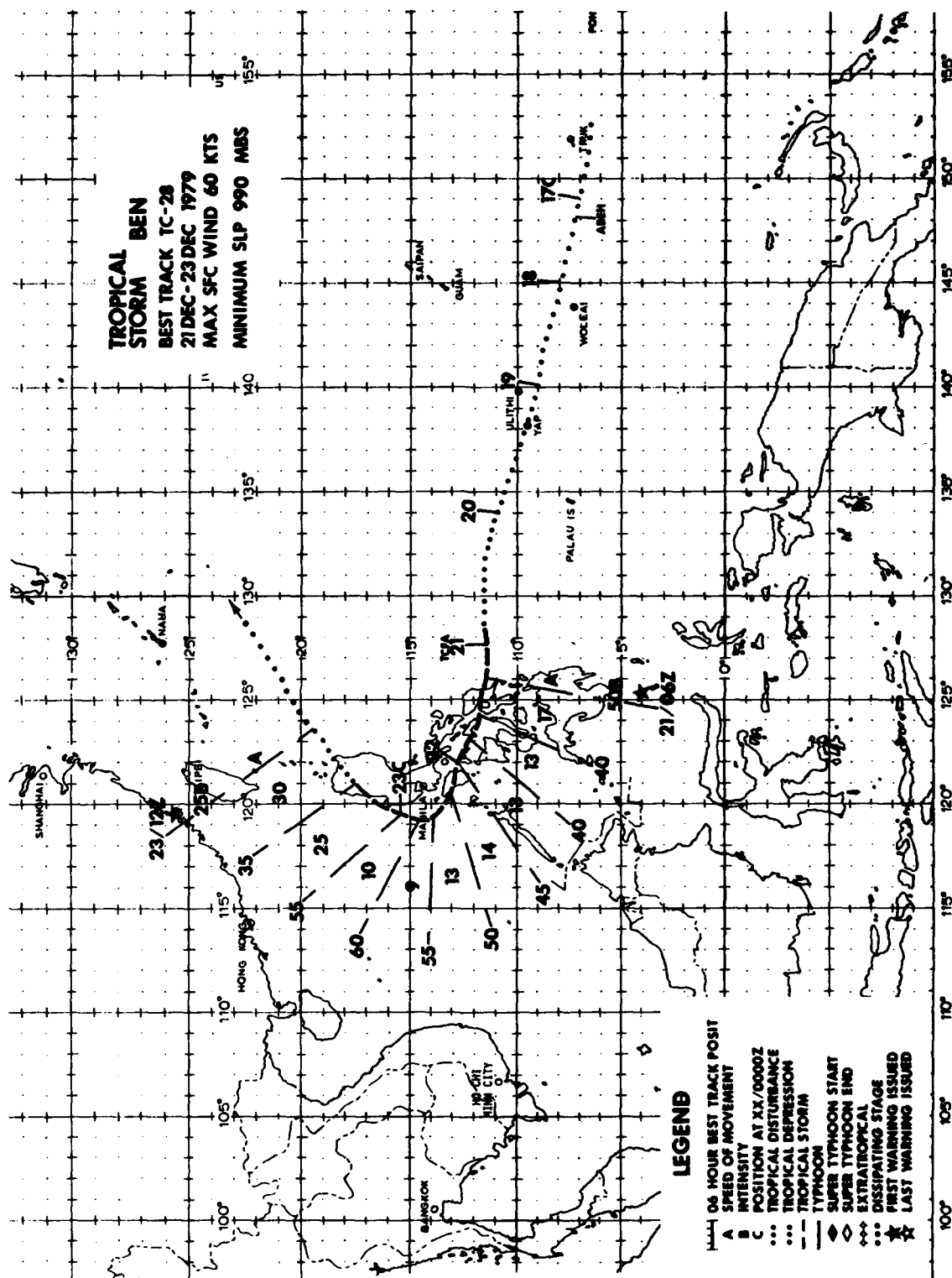
NL

4:3

 $\Delta \theta_{\text{eff}} = 0.001$ [illegible]



MICROCOPY RESOLUTION TEST CHART  
NATIONAL BUREAU OF STANDARDS-1963-A



TROPICAL STORM BEN (28)

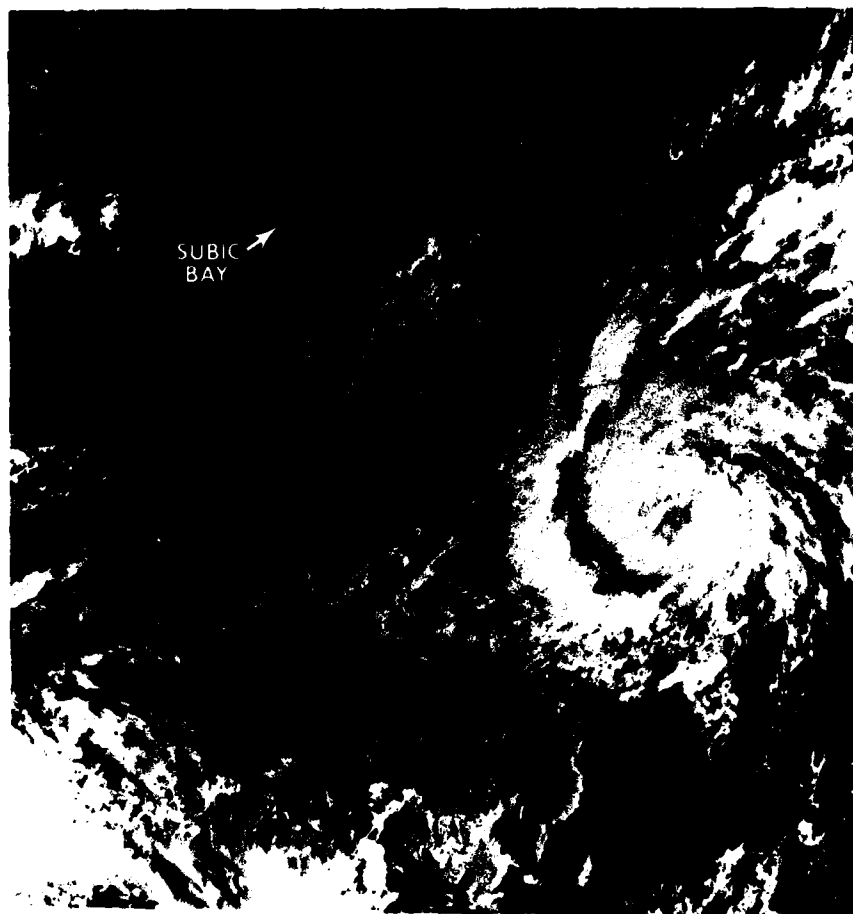


FIGURE 3-28-1. Tropical Storm Ben at 40 kt (21 m/sec) intensity, 21 October 1979, 0059Z. Ben was the last tropical cyclone in the western North Pacific during 1979. (DMSP imagery)

## 2. NORTH INDIAN OCEAN TROPICAL CYCLONES

During 1979, 7 significant tropical cyclones occurred in the North Indian Ocean area (Table 3-3). As usual, the transition

seasons between the northeast and southwest monsoon periods were the favored "cyclone seasons" (Table 3-4). This was an above normal season with most activity occurring during the fall transition period.

TABLE 3-3

### NORTH INDIAN OCEAN

#### 1979 SIGNIFICANT TROPICAL CYCLONES

<u>CYCLONE</u>	<u>PERIOD OF WARNING</u>	<u>CALENDAR DAYS OF WARNING</u>	<u>MAX SFC WIND</u>	<u>EST MIN SLP</u>	<u>NUMBER OF WARNINGS</u>	<u>DISTANCE TRAVELLED</u>
TC 17-79	06 MAY-12 MAY	7	85	967	26	1267
TC 18-79	18 JUN-20 JUN	3	50	985	12	581
TC 22-79	21 SEP-23 SEP	3	25	1000	10	694
TC 23-79	21 SEP-25 SEP	5	55	980	14	1108
TC 24-79	29 OCT-01 NOV	4	35	995	13	720
TC 25-79	16 NOV-17 NOV	2	40	994	8	547
TC 26-79	23 NOV-25 NOV	3	30	995	10	1071
1979 TOTALS		24*			93	

\*OVERLAPPING DAYS INCLUDED ONLY ONCE IN SUM.

TABLE 3-4.

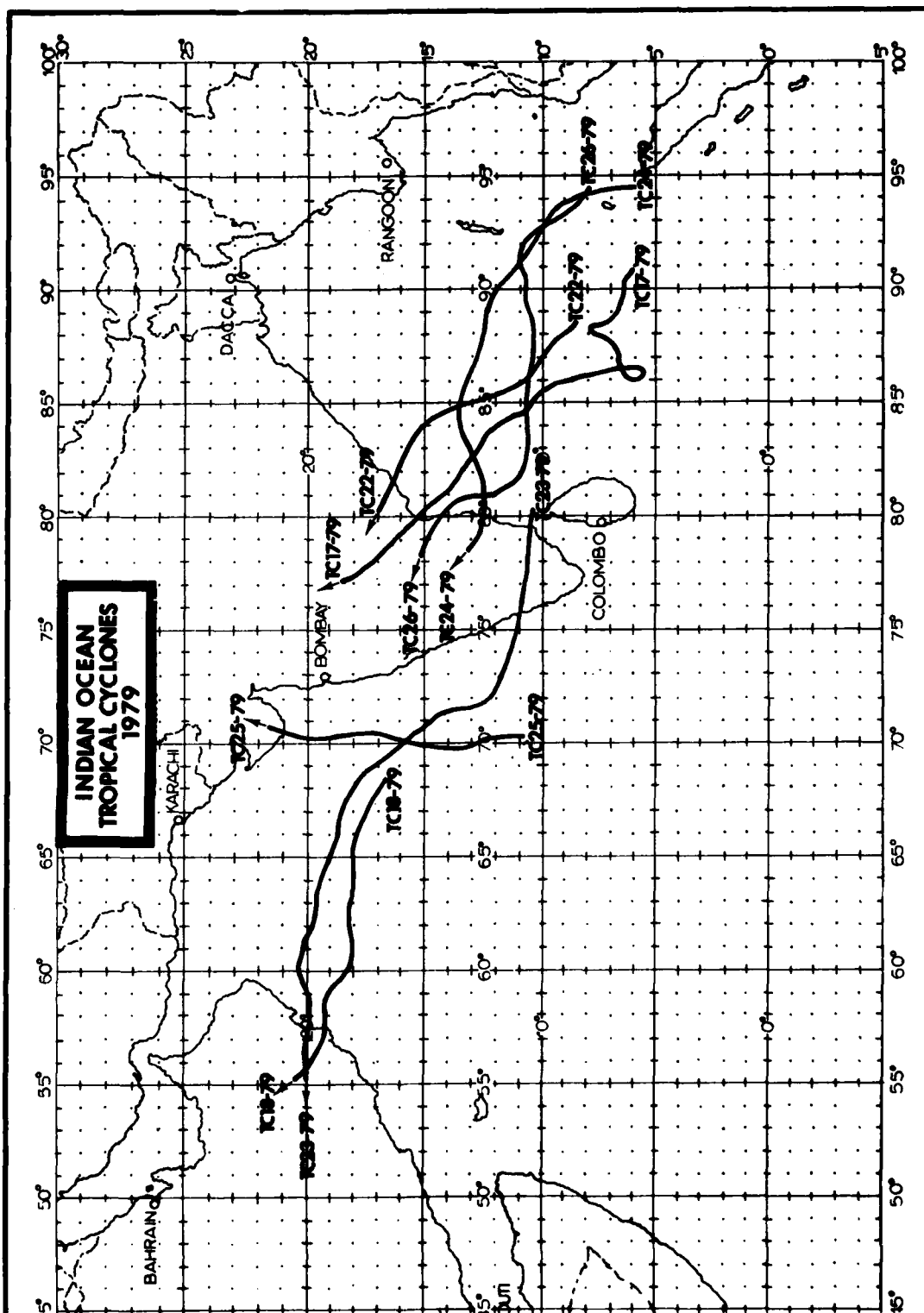
#### 1979 SIGNIFICANT TROPICAL CYCLONE STATISTICS

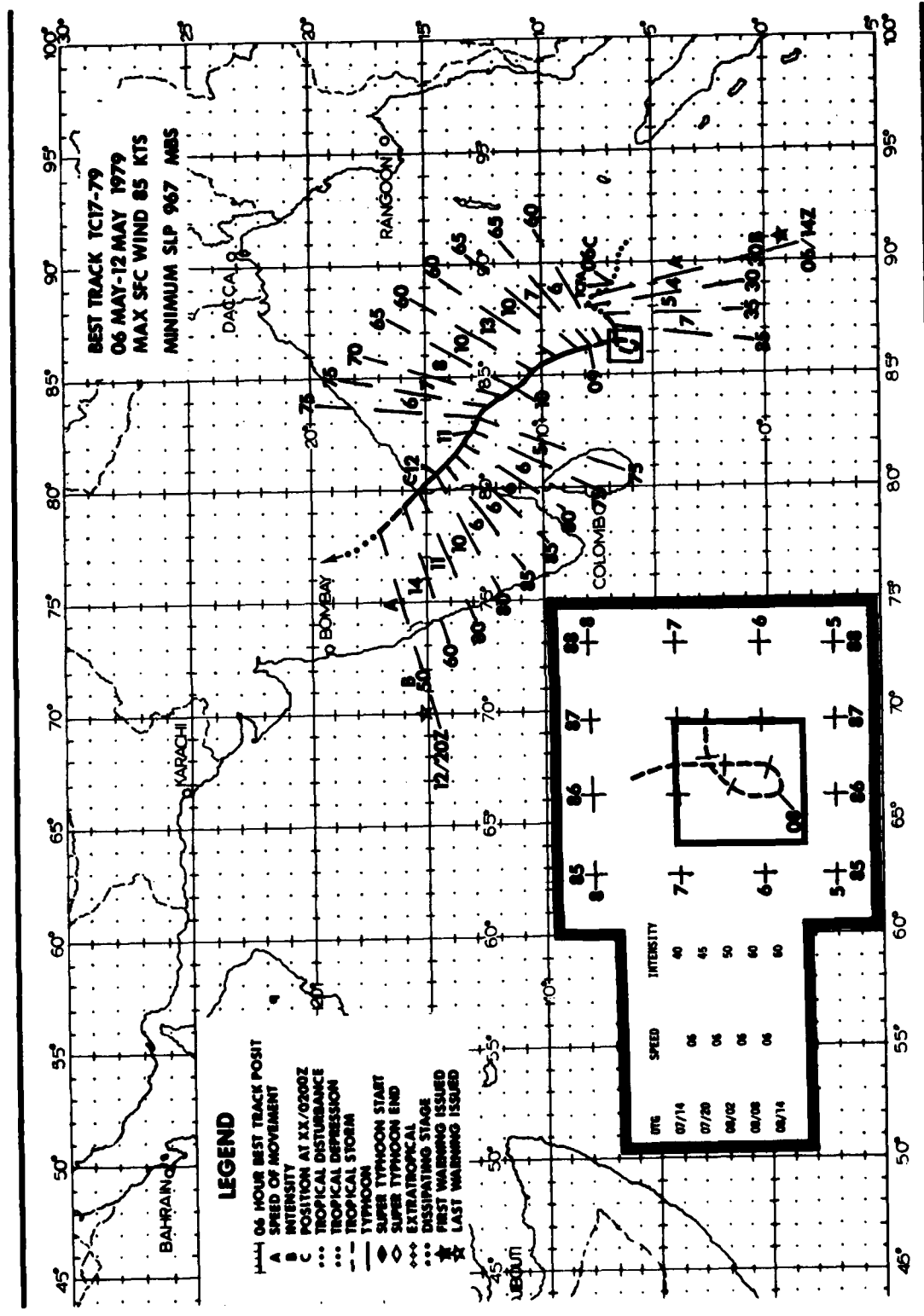
<u>NORTH INDIAN OCEAN</u>	<u>JAN</u>	<u>FEB</u>	<u>MAR</u>	<u>APR</u>	<u>MAY</u>	<u>JUN</u>	<u>JUL</u>	<u>AUG</u>	<u>SEP</u>	<u>OCT</u>	<u>NOV</u>	<u>DEC</u>	<u>TOTAL</u>
ALL CYCLONES	0	0	0	0	1	1	0	0	2	1	2	0	7
(1971-78) AVERAGE*	0.1	0	0	0.3	0.5	0.3	0	0	0.4	0.8	1.4	0.3	4

FORMATION ALERTS 7 of the 8 (87%) Formation Alert Events developed into numbered cyclones.

WARNINGS  
 Number of warning days: 25  
 Number of warning days with 2 cyclones: 3  
 Number of warning days with 3 or more cyclones: 0

\*From 1971 through 1974, only Bay of Bengal cyclones were considered; the JTWC area of responsibility was extended in 1975 to include Arabian Sea cyclones.





# TC 17-79

TC 17-79 was the only significant tropical cyclone in the Bay of Bengal during the 1979 spring transition season. Attaining typhoon intensity, TC 17-79 was the most destructive cyclone in India since TC 22-77 (Nov 1977) which, coincidentally, followed a similar track.

A Tropical Cyclone Formation Alert and the first warning were precipitated by synoptic reports received from ships participating in the First GARP Global Experiment (FGGE). At 1200Z on 6 May, these ships' observations defined a cyclonic circulation near 07N-088E with reported surface pressures near 1003 mb and wind speeds of 20-25 kt (10-12 m/sec). The first warning on TC 17-79 was issued at 061507Z.

From 060000Z through 061200Z, a strong mid-tropospheric ridge extended westward along 15N with southeast steering flow dominating TC 17-79's movement. During the same time period, a short-wave trough, evident at both middle and upper levels, was deepening over India. Interaction between this ridging and troughing resulted in a loss of definitive steering flow in the vicinity of TC 17-79, producing an erratic north and then south track. Also during this time, TC 16-79 located in the southern Indian Ocean about 750-800 nm (1389-1481 km) to the southwest,

began tracking slowly to the southeast possibly initiating a Fujiwhara type interaction.

By 080000Z, a mid-level anticyclone had formed in the northern Bay of Bengal with east-northeasterly steering flow over TC 17-79 resulting in a west-southwest forecast track. From 080000Z through 090000Z, while TC 17-79 intensified (Fig. 3-29), the dominant steering flow shifted to the south then southeast as the mid-level ridge was replaced by a trough and the upper-level trough dug southward over India. As a result of this shift in steering flow, TC 17-79 executed a tight cyclonic loop from 080000Z to 081800Z. From 7 through 9 May, though satellite fix position accuracies improved due to the formation of a well-defined eye, forecast errors increased appreciably due to the erratic movement.

By 091200Z, southeast steering flow became dominant with TC 17-79 oscillating about a northwest track until making landfall over India (Fig. 3-30). TC 17-79 struck the east central coast of India at 120800Z, 45 nm (83 km) north of Nellore with maximum sustained winds of 80 kt (41 m/sec). Twenty-one deaths occurred and over 800,000 persons were left homeless as a result of TC 17-79's passage over the Nellore district.



FIGURE 3-29. TC 17-79 with well-defined satellite signature during the erratic cyclonic loop, 8 May 1979, 0528Z. (DMSP imagery from AFGWC, Offutt AFB, Nebraska)

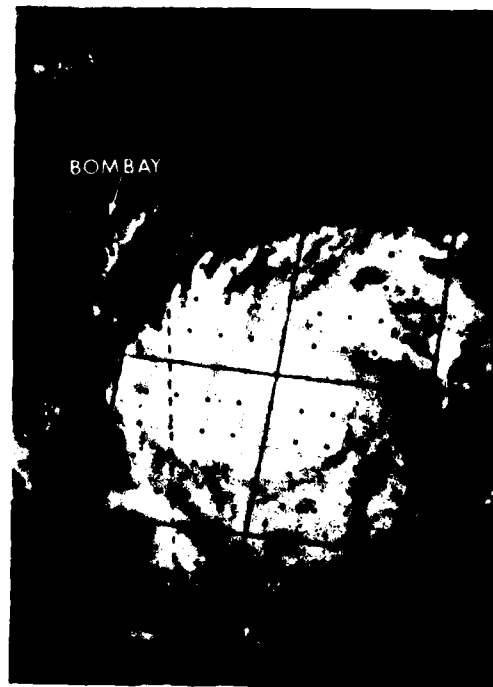
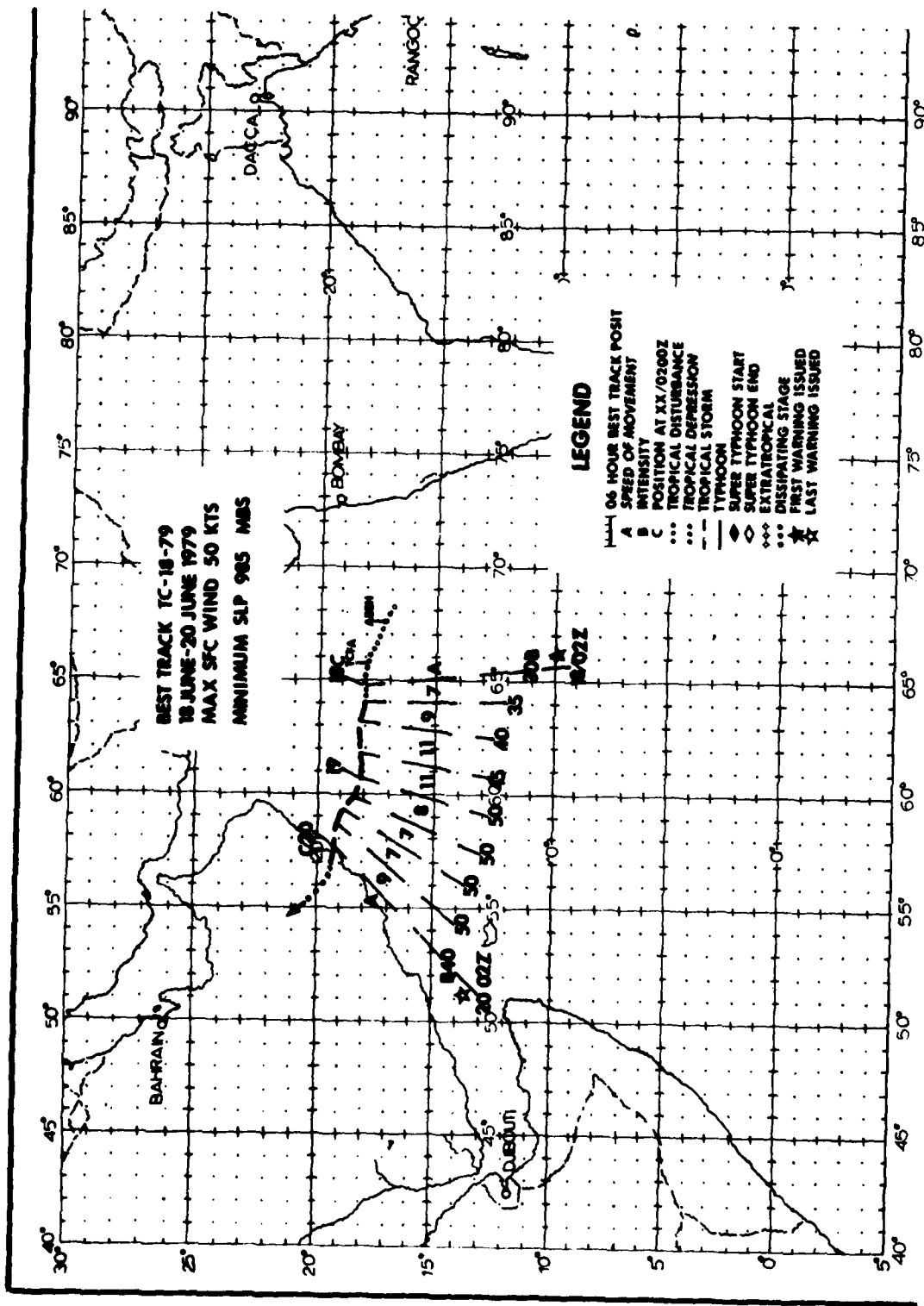


FIGURE 3-30. TC 17-79 just prior to making landfall over east central India with 80 kt (41 m/sec) intensity, 12 May 1979, 0556Z. (DMSP imagery from AFGWC, Offutt AFB, Nebraska)



# TC 18-79

TC 18-79 began 171400Z June 1979 as a monsoon depression in the Arabian Sea and tracked virtually westward throughout its life, finally dissipating over the Oman coast (Fig. 3-31). Although TC 18-79's movement was confined to a narrow 2-degree latitudinal band, the extent of the meteorological hazard from gale force winds encompassed roughly half of the Arabian Sea. These gale force winds were produced by the interaction of TC 18-79 with the normal southwest monsoonal flow over the Arabian Sea.

During this season, a climatological low-level wind maximum develops off the coast of Somali. Normal wind speeds can reach 35-40 kt (18-21 m/sec), but the gale area is generally localized near the coast. However, beginning 2 days prior to TC 18-79's forma-

tion, a surge in the monsoonal flow occurred and a low-level jet could be traced from the Somali coast extending eastward across the entire Arabian Sea. The strength and persistence of this feature aided the formation of TC 18-79 in the cyclonic shear side of the wind maximum. As TC 18-79 intensified and moved westward, the southwesterly flow strengthened to a point where 65 kt (33 m/sec) surface winds were observed 600 nm (1111 km) away from TC 18-79's center. Examination of the visual data of Figure 3-31 shows cloud streets indicative of this strong low-level flow from 05N to 12N between 55E to 62E. The gale area persisted during TC 18-79's dissipation over land, weakening gradually with time. Interestingly, post-analysis reveals the maximum winds in the gale area exceeded the maximum sustained winds estimated in TC 18-79's center.

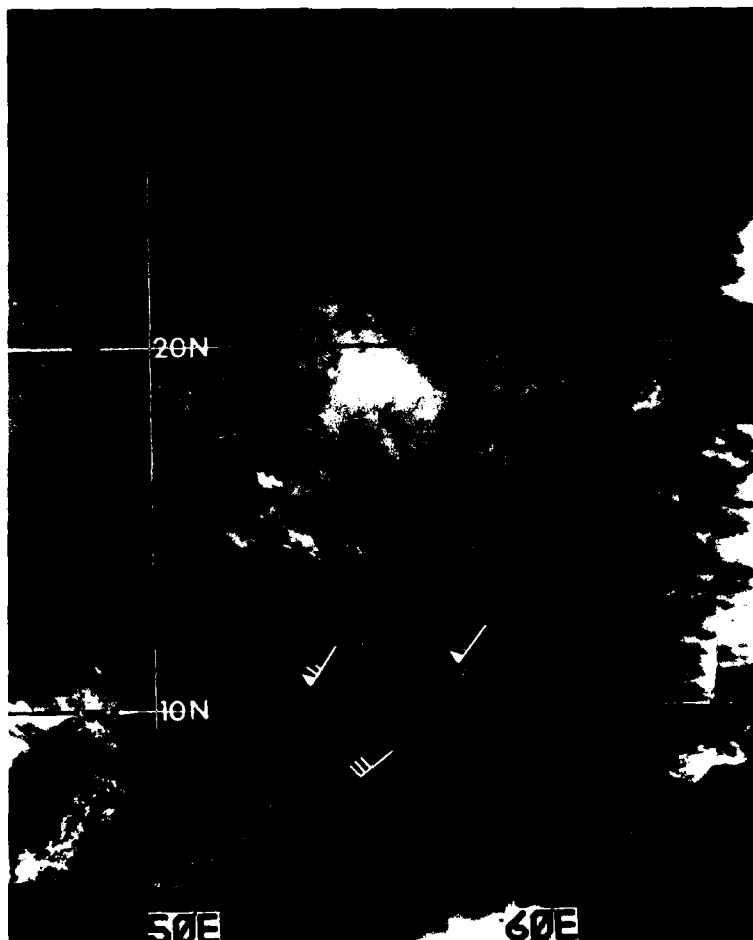
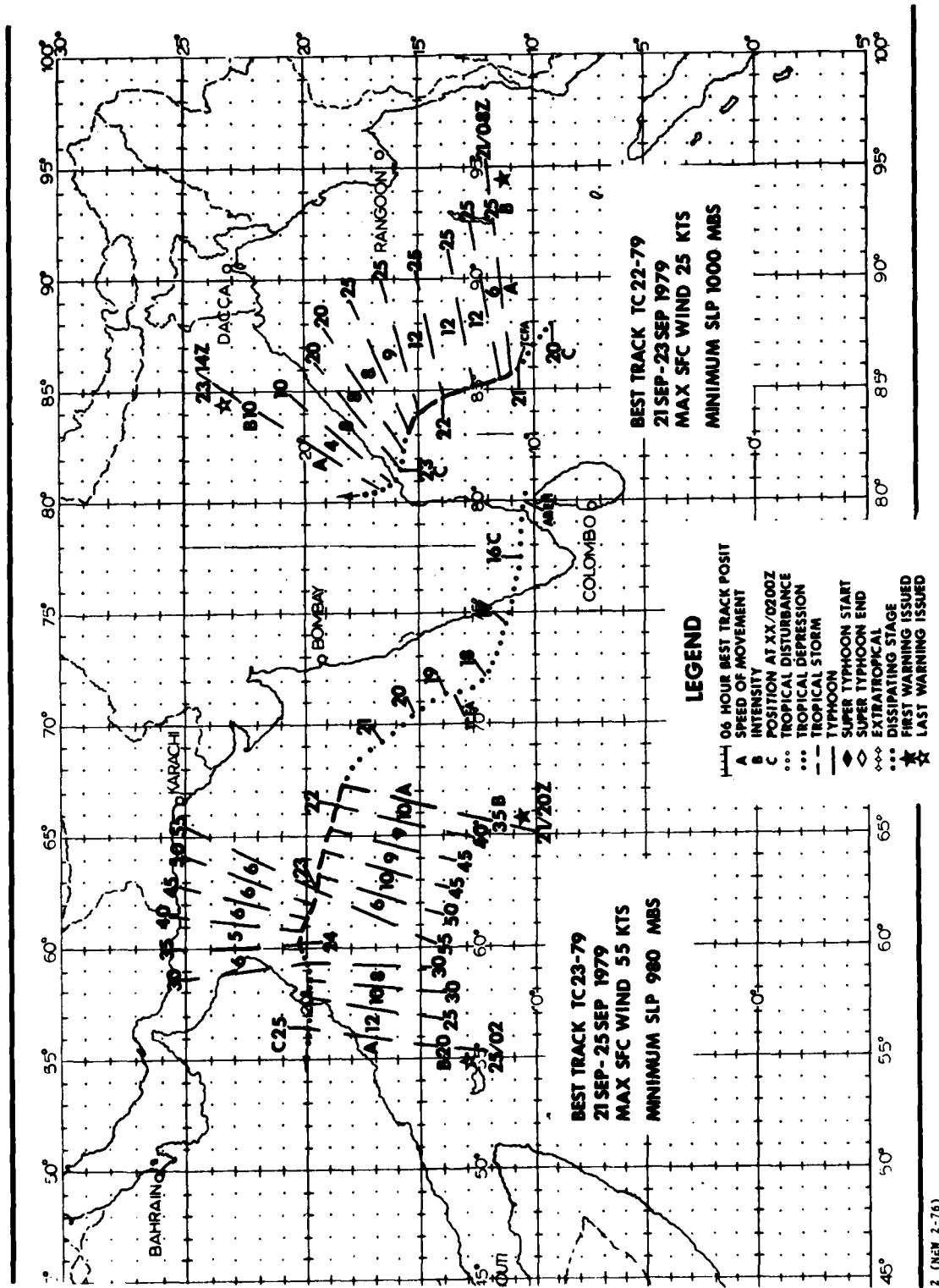
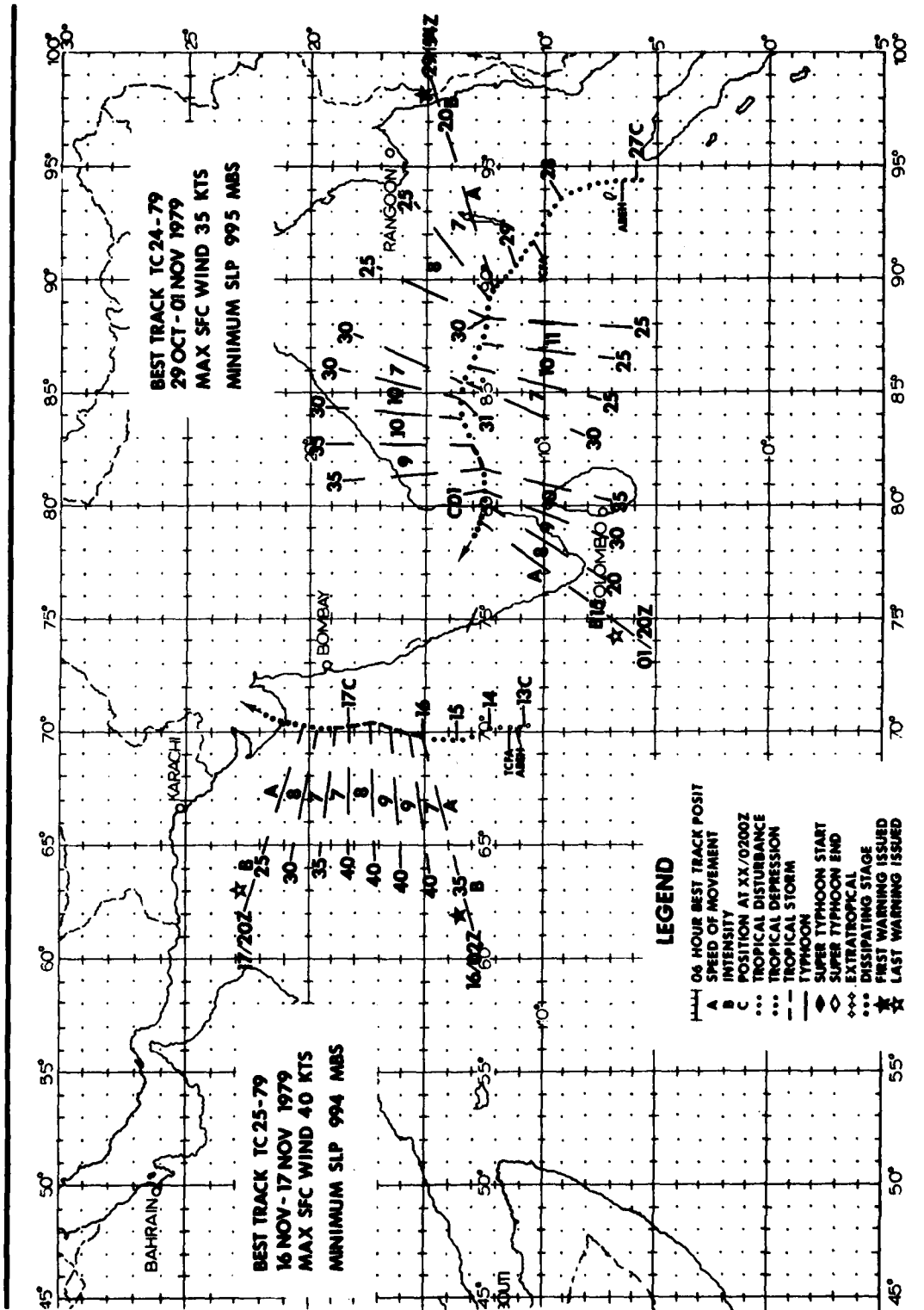
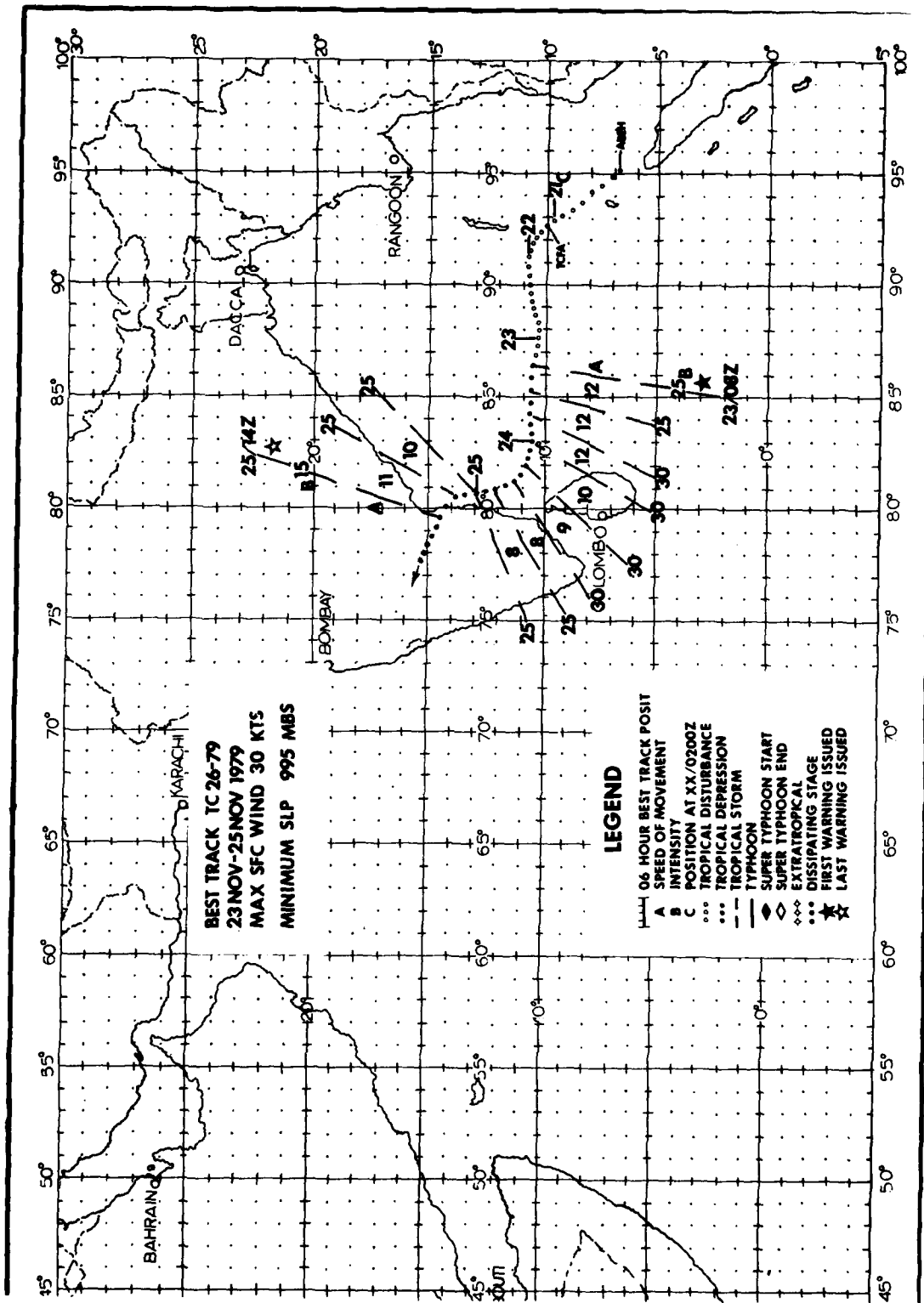


FIGURE 3-31. TC 18-79 located just off the Oman coast with gale force winds to the south, 20 June 1979, 0731Z. Superimposed are ship observations at 200600Z. (DMSP imagery from AFGWC, Offutt AFB, Nebraska)







TC 26-79

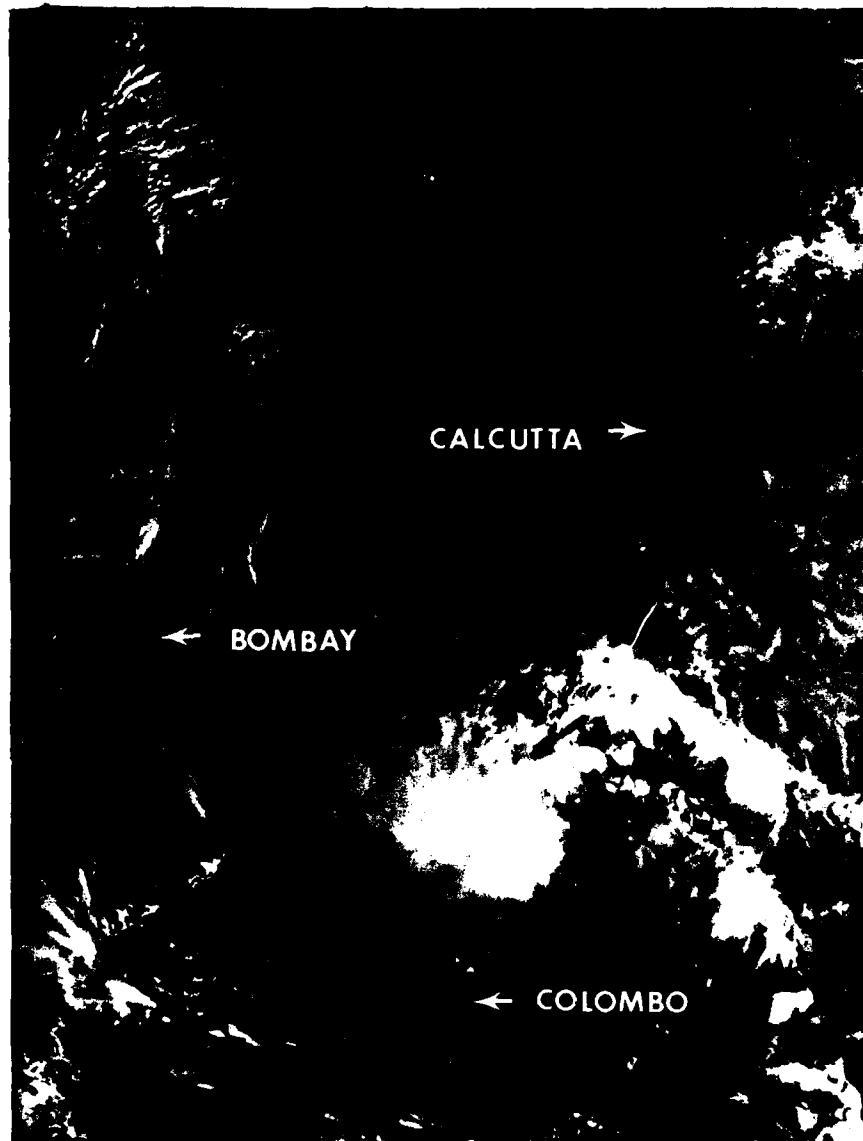


FIGURE 3-32. TC 26-79 as an exposed low-level circulation, 24 November 1979, 0455Z. (DMSP imagery from AFGWC, Offutt AFB, Nebraska)

## CHAPTER IV SUMMARY OF FORECAST VERIFICATION

### 1. ANNUAL FORECAST VERIFICATION

#### a. Western North Pacific Area

Forecast positions at warning times and 24-, 48-, and 72-hour valid times were verified against corresponding best tracks. Vector errors and right angle errors for individual tropical cyclones were calculated

and are displayed in Table 4-1. Annual mean errors for all tropical cyclones are listed in Table 4-2 for comparison. Frequency distributions of the vector errors for 24-, 48-, and 72-hour forecasts on all 1979 tropical cyclones are shown in Figure 4-1. Annual mean vector errors are graphed in Figure 4-2.

TABLE 4-1. FORECAST ERROR SUMMARY FOR THE 1979 WESTERN NORTH PACIFIC SIGNIFICANT TROPICAL CYCLONES.

CYCLONE	WARNING			24 HOUR			48 HOUR			72 HR		
	POSIT ERROR	RT ANGLE ERROR	# WRNGS	POSIT ERROR	RT ANGLE ERROR	# WRNGS	POSIT ERROR	RT ANGLE ERROR	# WRNGS	POSIT ERROR	RT ANGLE ERROR	# WRNGS
1. TY ALICE	18	11	51	105	83	47	222	175	43	338	271	39
2. TY BESS	19	15	21	114	73	17	265	164	13	348	240	9
3. TY CECIL	15	11	40	87	62	37	191	131	33	320	215	29
4. TS DOT	23	16	24	130	79	23	244	171	20	315	257	16
5. TD-05	12	12	6	158	150	3						
6. TY ELLIS	25	21	22	71	57	18	145	103	14	185	113	10
7. TS FAYE	35	21	20	138	86	17	167	93	14	180	99	10
8. TD-08	43	20	5	195	70	4	396	396	1			
9. TS GORDON	23	12	13	129	90	9	173	121	5	449	278	1
10. TS HOPE	23	16	33	134	75	29	266	140	23	376	188	21
11. TD-11	47	30	14	144	94	10	138	89	6	171	129	2
12. TY IRVING	26	17	38	163	98	34	286	209	30	441	344	26
13. ST JUDY	18	12	39	105	81	36	173	138	27	277	213	23
14. TD-14	33	19	9	157	43	5	296	118	1			
15. TS KEN	29	13	13	116	60	10	278	111	7	415	195	3
16. TY LOLA	16	10	23	88	64	21	172	148	19	287	236	14
17. TY MAC	23	16	35	93	66	27	196	152	19	279	227	19
18. TS NANCY	28	19	14	116	86	9	216	186	4	227	219	1
19. TY OWEN	25	15	37	146	78	33	250	158	29	327	256	25
20. TS PAMELA	28	22	6	254	15	2						
21. TS ROGER	32	19	16	195	93	13	251	108	9	303	178	4
22. TY SARAH	26	16	43	61	40	39	110	86	34	143	107	27
23. ST TIP	24	15	60	135	69	56	259	142	52	345	214	48
24. ST VERA	43	20	23	148	69	19	249	111	15	385	247	11
25. TS WAYNE	27	14	22	170	115	16	362	295	12	443	413	4
26. TY ABBY	31	17	52	164	108	48	286	198	39	338	215	26
27. TD-26	21	16	6	55	28	3						
28. TS BEN	34	18	10	81	89	6	287	16	2			
ALL FORECASTS	25	16	695	124	77	591	226	151	471	316	223	368

TABLE 4-2. ANNUAL MEAN FORECAST ERRORS FOR THE WESTERN NORTH PACIFIC.

YEAR	24-HR		48-HR		72-HR	
	VECTOR	RIGHT ANGLE	VECTOR	RIGHT ANGLE	VECTOR	RIGHT ANGLE
1971	111	64	212	118	317	177
1972	117	72	245	146	381	210
1973	108	74	197	134	253	162
1974	120	78	226	157	348	245
1975	138	84	288	181	450	290
1976	117	71	230	132	338	202
1977	148	83	283	157	407	228
1978	127	75	271	179	410	297
1979	124	77	226	151	316	223

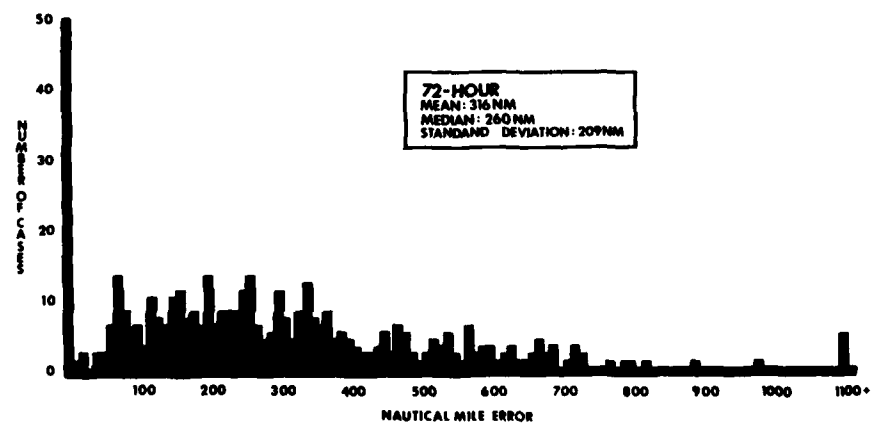
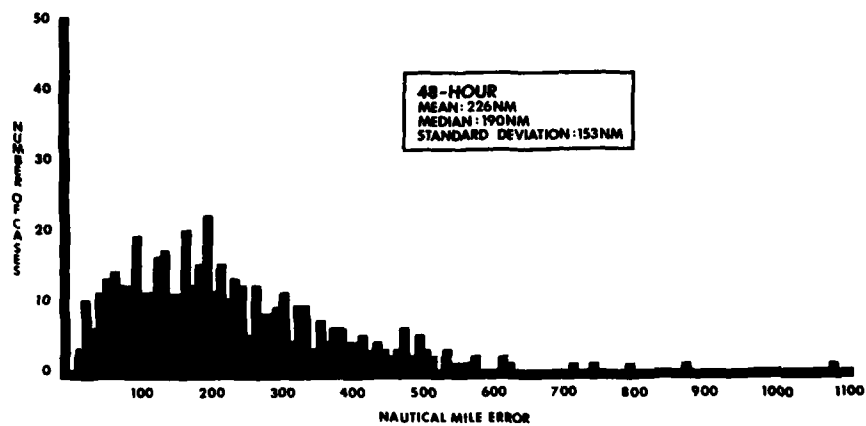
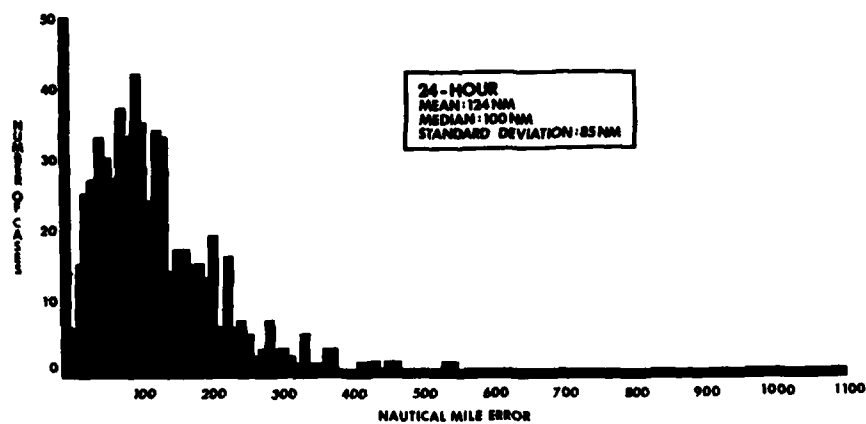


FIGURE 4-1. Frequency distribution of 1979 24-, 48-, and 72-hour forecast vector errors for all significant tropical cyclones in the western North Pacific.

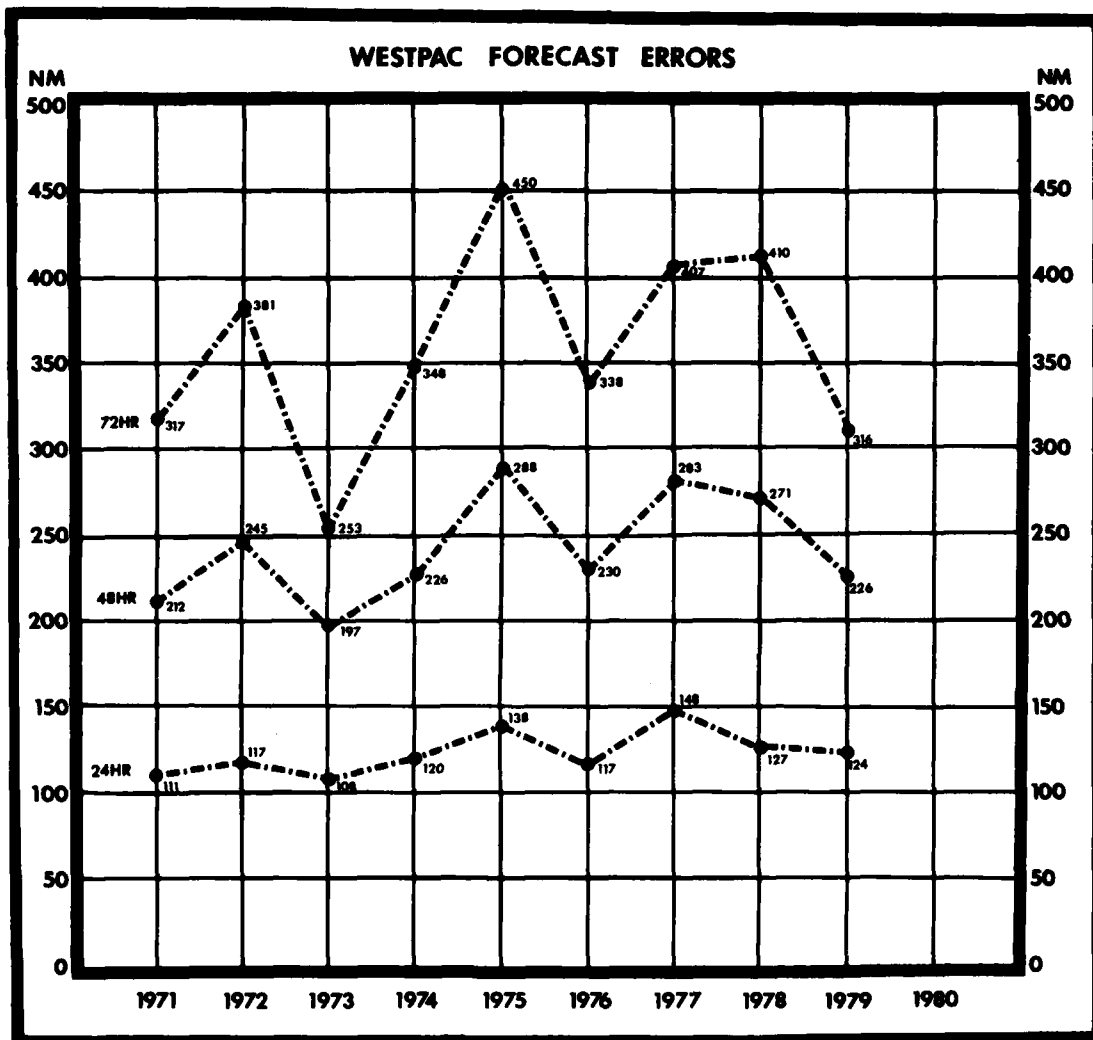


FIGURE 4-2. Annual vector errors (nm) for all cyclones in the western North Pacific.

Intensity verification statistics for all significant tropical cyclones in the western North Pacific area are depicted in Figures 4-3 and 4-4. The average absolute magnitude of the intensity error as well as the intensity bias (algebraic average) are graphically depicted. An analysis of the errors indicates that JTWC intensity forecasts often lag true intensity. In intensi-

fying situations, JTWC underforecasts, while in weakening situations JTWC overforecasts. This causes a large average magnitude error, but a small average bias. Verification of intensity forecasts by objective aids is also depicted in Figures 4-3 and 4-4. (An explanation of the objective forecasting aids is found in this chapter, Section 2-Comparison of Objective Techniques.)

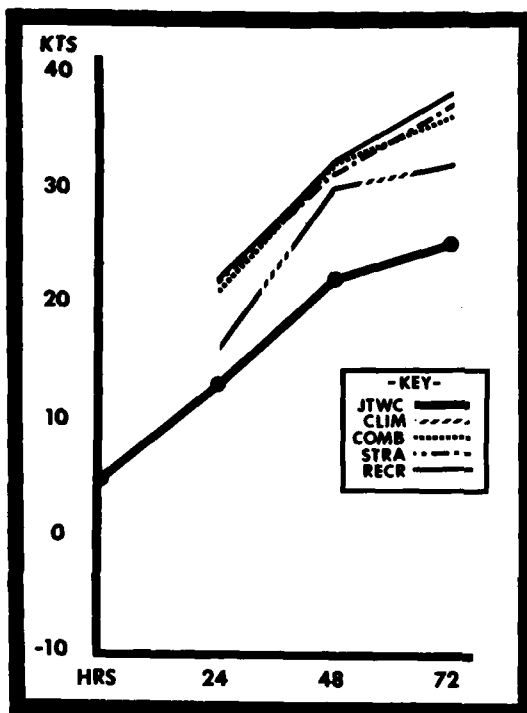


FIGURE 4-3. Comparison of average intensity errors (magnitude) for all cyclones in the western North Pacific.

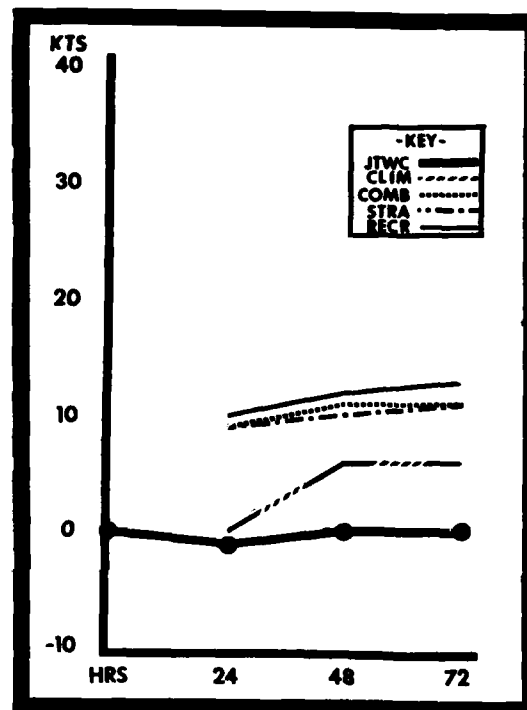


FIGURE 4-4. Comparison of average intensity errors (biases) for all cyclones in the western North Pacific.

b. North Indian Ocean Area

Forecast positions at Warning times and 24-, 48-, and 72-hour valid times were verified by the same methods used for the western North Pacific area. Table 4-3 is the forecast error summary for the significant tropical cyclones in the North Indian

Ocean area. Table 4-4 contains the annual average of forecast errors back through 1971. Vector errors are plotted in Figure 4-5. Seventy-two hour forecast errors were evaluated for the first time in 1979.

Forecast intensities were not verified.

TABLE 4-3. FORECAST ERROR SUMMARY FOR THE 1979 NORTH INDIAN OCEAN SIGNIFICANT TROPICAL CYCLONES.

CYCLONE	WARNING			24 HOUR			48 HOUR			72 HOUR		
	POSIT ERROR	RT ANGLE °	WINGS	POSIT ERROR	RT ANGLE °	WINGS	POSIT ERROR	RT ANGLE °	WINGS	POSIT ERROR	RT ANGLE °	WINGS
TC 17-79	36	17	26	139	95	22	233	192	18	346	296	14
TC 18-79	48	24	12	137	78	7	363	284	4			
TC 21-79	34	34	10	122	90	7	170	122	3			
TC 23-79	48	21	14	160	97	9	253	184	5	773	629	2
TC 24-79	48	26	13	190	142	9	482	332	5	1036	902	1
TC 25-79	50	26	8	189	103	4	121	73	1			
TC 26-79	52	31	10	148	83	5	163	21	2			
ALL FORECASTS	46	24	93	151	99	63	270	202	38	437	371	17

TABLE 4-4. ANNUAL MEAN FORECAST ERRORS FOR THE NORTH INDIAN OCEAN (the Arabian Sea was not included prior to 1975).

YEAR	24-HR		48-HR		72-HR	
	VECTOR	RIGHT ANGLE	VECTOR	RIGHT ANGLE	VECTOR	RIGHT ANGLE
1971	232	-	410	-	-	-
1972	224	101	292	112	-	-
1973	182	99	299	160	-	-
1974	137	81	238	146	-	-
1975	145	99	228	144	-	-
1976	138	108	204	159	-	-
1977	122	94	292	214	-	-
1978	133	86	202	128	-	-
1979	151	99	270	202	437	371

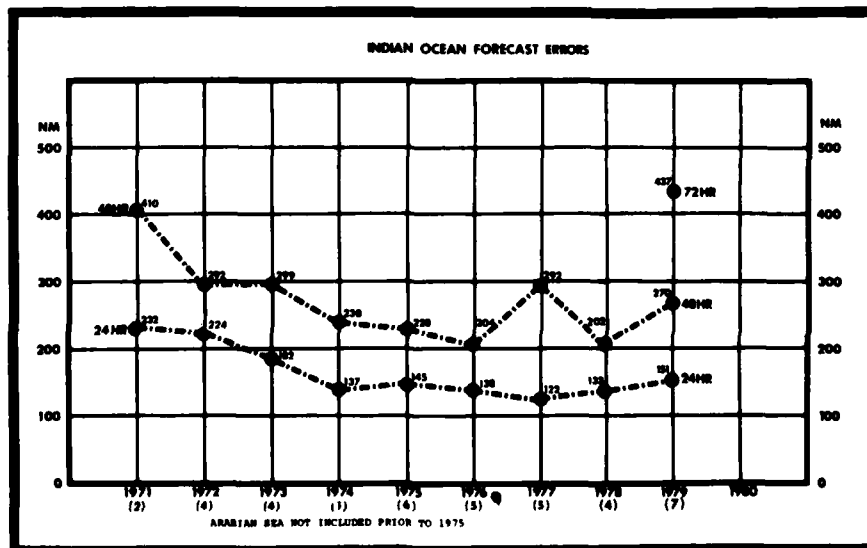


FIGURE 4-5. Annual mean vector errors (nm) for all cyclones in the North Indian Ocean.

## 2. COMPARISON OF OBJECTIVE TECHNIQUES

### a. General

Objective techniques used by JTWC are divided into four main categories: (1) climatological and analog techniques; (2) extrapolation; (3) steering techniques; and (4) a dynamic model. The analog technique provides three movement forecasts: one for straight moving cyclones, one for recurving cyclones and one which combines the tracks of straight, recurving and cyclones that do not meet the criteria of straight or recurving analogs. All techniques were executed using the operational data available at warning time.

### b. Description of Objective Techniques

(1) TYFN75 - Analog program which scans history tapes for cyclones similar (within a specified acceptance envelope) to the current cyclone. Three 24-, 48-, and 72-hour position and intensity forecasts are provided (straight, recurve and combined).

(2) MOHATT 700/500 - Steering program which advects a point vortex on a preselected analysis and smoothed prognostic field at designated levels in 6-hour time steps through 72 hours. Utilizing the previous 12-hour history position, MOHATT computes the 12-hour forecast error and applies a bias correction to the forecast position.

(3) TCM - The Tropical Cyclone Forecast model is a coarse mesh (220 km) PE Model, with the digitized storm warning position bogused in the 850 mb wind and temperature fields of the FLENUMOCEANCEN Global Band Analysis. Hemispheric forecast data are used on the boundaries.

(4) CLIM - A climatological aid in the form of 24-, 48-, and 72-hour tropical

cyclone forecast positions and intensity changes for initial latitude/longitude positions. The data are arranged by months and are based on historical data which includes 1945 to 1973. This detailed climatology replaced the previous JTWC climatology on 1 September 1980.

(5) 12-HR EXTRAPOLATION - A track through the current warning position and the 12-hour old preliminary best track position is linearly extrapolated to 24 and 48 hours.

(6) HPAC - The 24- and 48-hour forecast positions are derived by averaging the 24- and 48-hour positions from the 12-hour EXTRAPOLATION track and the CLIM track.

(7) INJAH74 - Analog program for the North Indian Ocean similar to TYFN75, except tracks are not segregated.

(8) TYAN - An updated analog program which combines TYFN75 and INJAH74.

(9) CYCLOPS - An updated version of the MOHATT program which has the capability to select steering forecasts at the 1000, 850, 700, 500, 400, 300 and 200 mb levels.

### c. Testing and Results

A comparison of selected techniques is included in Table 4-5 for all western North Pacific cyclones and in Table 4-6 for Indian Ocean cyclones. In Tables 4-5 and 4-6, "X-AXIS" refers to techniques listed horizontally across the top, while "Y-AXIS" refers to techniques listed vertically. The example in Table 4-5 compares COMB to MH70. In the 425 cases available for comparison, the average 24-hour vector error was 134 nm for COMB and 160 nm for MH70. The difference of 26 nm is shown in the lower right. (Differences are not always exact due to computational round off.)

TABLE 4-5.

STATISTICS FOR YEAR 24 HR FCSTS											
JTWC	STRA	RECR	COMB	NH70	NH50	TCMD	CLIM	XTRP	HPAC		
JTWC 591 124 124 0										NUMBER OF CASES	2-ACEE TECHNIQUE BIAS
STRA 525 122 533 153 153 31 153 0											
RECR 516 127 489 153 524 139 139 12 136 -16 139 0										Y-ACEE TECHNIQUE BIAS	ERROR DIFFERENCE Y-X
COMB 543 124 514 153 509 139 551 135 138 10 133 -19 135 -3 135 0											
NH70 435 123 407 150 399 136 425 134 159 36 158 8 163 26 160 25											
NH50 425 124 396 152 389 136 413 135 430 159 434 157 158 35 157 5 160 25 159 24 157 -1 157 0											
TCMD 121 122 111 152 104 128 115 127 96 146 96 138 124 136 132 10 134 -16 146 18 141 14 143 -4 142 4 136 0											
CLIM 305 129 282 165 265 152 291 145 245 170 245 162 93 144 315 150 150 20 142 -22 150 -1 149 3 149 -20 150 -11 153 9 150 0											
XTRP 572 124 521 152 511 138 538 133 439 159 431 158 124 136 309 150 584 149 150 26 146 -5 153 15 150 17 145 -13 145 -12 142 6 168 18 149 0											
HPAC 559 124 514 152 501 137 527 133 434 158 426 158 124 136 309 150 571 150 571 134 134 10 129 -23 135 -2 134 1 133 -24 132 -25 129 -6 138 -11 134 -15 134 0											

STATISTICS FOR YEAR 48 HR FCSTS											
JTWC	STRA	RECR	COMB	NH70	NH50	TCMD	CLIM	XTRP	HPAC		
JTWC 471 226 226 0										JTWC - OFFICIAL JTWC FORECAST STRA - SURFACET (TYPE 75) RECR - RECURVE (TYPE 75) COMB - COMBINED (TYPE 75) NH70 - HURRY 700-HR PROG NH50 - HURRY 500-HR PROG TCMD - TROPICAL CYCLONE MODEL (OMB-NM) CLIM - CLIMATOLOGY XTRP - 12-HOUR EXTRAPOLATION HPAC - MEAN OF XTRP AND CLIMATOLOGY	
STRA 437 224 462 306 309 85 306 0											
RECR 415 232 422 306 440 252 247 15 248 -57 252 0											
COMB 440 225 449 306 430 251 466 244 244 20 243 -62 243 -7 244 0											
NH70 330 222 340 307 323 249 347 243 359 308 313 91 308 1 318 69 310 67 308 0											
NH50 330 220 339 305 320 247 345 242 345 310 358 295 299 79 296 -8 297 50 297 55 292 -17 295 0											
TCMD 98 232 97 314 86 246 96 254 76 357 76 283 102 257 249 18 255 -57 273 27 264 10 264 -92 263 -20 257 0											
CLIM 244 235 249 330 222 276 247 265 205 337 206 294 75 272 263 250 246 11 243 -86 251 -25 252 -12 242 -94 242 -51 260 -11 250 0											
XTRP 457 224 450 304 430 249 454 241 351 309 353 296 101 255 260 249 485 291 291 67 290 -13 298 49 292 51 295 -13 291 -4 311 56 325 76 291 0											
HPAC 445 223 442 305 418 246 442 242 345 308 346 295 101 255 260 249 471 291 471 233 232 9 231 -74 235 -10 233 -7 231 -75 228 -66 245 -9 235 -13 233 -57 233 0											

STATISTICS FOR YEAR 72 HR FCSTS									
JTWC	STRA	RECR	COMB	NH70	NH50	TCMD	CLIM		
JTWC 368 316 316 0									
STRA 338 315 381 453 443 129 453 0									
RECR 319 331 345 456 360 349 327 -3 348 -107 349 0									
COMB 343 316 370 452 352 349 385 340 328 12 343 -109 336 -12 340 0									
NH70 230 325 260 464 236 362 259 352 267 473 471 147 474 10 488 126 475 122 473 0									
NH50 227 329 258 467 234 364 257 355 259 469 265 486 482 153 481 14 488 124 482 127 479 10 486 0									
TCMD 73 314 78 445 69 351 78 359 61 543 62 484 84 372 347 33 376 -68 393 41 380 22 401 -141 396 -87 372 0									
CLIM 184 308 208 494 179 357 204 366 161 506 164 483 64 389 218 332 315 7 333 -160 338 -18 334 -31 329 -176 331 -151 353 -34 332 0									

STATISTICS FOR YEAR		24 HR FCSTS									
	JTWC	INJA		MH70		MH50		TCMO		XTRP	HPAC
JTWC	63 151 151 0										
INJA	48 134 125 -7	52 127 127 0									
MH70	28 159 173 14	27 132 175 44	30 180 180 0								
MH50	27 158 167 9	26 132 164 32	29 175 173 -1	29 173 173 0							
TCMO	2 43 164 121	2 53 164 111	2 73 164 91	2 64 164 100	2 164 164 0						
XTRP	61 147 146 0	52 127 130 3	30 180 148 -32	29 173 149 -23	2 164 14 -150	65 148 148 0					
HPAC	40 148 135 -12	32 134 128 -5	16 179 146 -31	15 175 148 -26	2 164 43 -120	40 145 135 -9	40 135 135 0				

NUMBER OF CASES

Y-AXIS TECHNIQUE ERROR

X-AXIS TECHNIQUE ERROR

ERROR DIFFERENCE Y-X

JTWC - OFFICIAL JTWC FORECAST

INJA - ANALOG (INJAH74)

MH70 - MOHATT 700-MB PROG

MH50 - MOHATT 500-MB PROG

XTRP - 12-HOUR EXTRAPOLATION

HPAC - MEAN OF XTRP AND CLIMATOLOGY

TABLE 4-6.

## CHAPTER II APPLIED TROPICAL CYCLONE RESEARCH SUMMARY

### I. JTWC RESEARCH

Part of the mission of the Joint Typhoon Warning Center is to conduct applied tropical cyclone research as time and resources permit. The purpose of this research is to improve the timeliness and accuracy of operational forecasts. During 1979, there was continued effort to convert and update operational programs and to streamline operational procedures for compatibility with the Naval Environmental Display Station. The following abstracts summarize the year's applied research projects which were completed or are still in progress.

#### ESTABLISHMENT OF THE JTWC TROPICAL CYCLONE DATA BASE

(Curry, W. T. and Matsumoto, C. R., NAVOCEANCOMCEN/JTWC)

A data base of 6-hour best track positions (intensities, direction and speed of movement) and 24-, 48-, and 72-hour objective technique and official JTWC forecasts for each tropical cyclone in the western North Pacific, Arabian Sea and Bay of Bengal from 1966 through 1978 has been established on FLENUMOCEANCOMCEN computer mass storage systems. Tropical cyclone fix data (position, intensities, platform, etc.) for each tropical cyclone from 1966 through 1977 remain to be added. This climatological data base will be maintained on disk and tape files at FLENUMOCEANCOMCEN Monterey, California and updated annually.

#### NEDS/COMPUTER APPLICATIONS

(Staff, NAVOCEANCOMCEN/JTWC)

JTWC's objective techniques have been converted by contractors to execute on FLENUMOCEANCOMCEN computers. A NEDS graphic capability is being developed to depict forecast tracks from objective techniques. Evaluation and monitoring of program conversion will continue in 1980.

#### TROPICAL CYCLONE MINIMUM SEA-LEVEL PRESSURE - MAXIMUM SUSTAINED WIND RELATIONSHIP

(Lubeck, O. M. and Shewchuk, J. D., NAVOCEANCOMCEN/JTWC)

The pressure-wind relationship developed by Atkinson and Holliday (1977), Tropical Cyclone Minimum Sea Level Pressure - Maximum Sustained Wind Relationship for Western North Pacific, is a primary tool used to determine tropical cyclone intensities for JTWC operations. This relationship was re-evaluated and tested with an independent data set. The study produced no significant differences or changes. Therefore, the current Atkinson and Holliday relationship will continue to be used at JTWC. Other regression equations using case-dependent latitude and environmental pressure (versus 1010 mb) as predictors were also tested. These predictors did not improve the maximum sustained wind-minimum sea-level pressure relationship.

#### OBJECTIVE TROPICAL CYCLONE INITIAL POSITIONING WITH A WEIGHTED LEAST SQUARES ALGORITHM

(Lubeck, O. M. and Shewchuk, J. D., NAVOCEANCOMCEN/JTWC)

Recent studies indicate tropical cyclone forecast errors through 72 hours can be reduced by more accurate initial warning positions. This study developed an objective and standardized method of determining initial position based on all available fix information. A least squares algorithm was used on available fix data with a weighting scheme which is inversely proportional to the stated fix accuracies. The results of this objective method showed no significant improvement over the current subjective method. Therefore, this method was not incorporated into operational procedures. This method, however, produces an improved tropical cyclone "best track" and was incorporated into JTWC's post-analysis procedures.

#### EQUIVALENT POTENTIAL TEMPERATURE/MINIMUM SEA-LEVEL PRESSURE RELATIONSHIPS FOR FORECASTING TROPICAL CYCLONE INTENSIFICATION

(Dunnavan, G. M., NAVOCEANCOMCEN/JTWC)

The relationship between equivalent potential temperature at 700 mb in the center of developing tropical cyclones and associated intensity changes was explored by Sikora (ATR 1975), Milner (ATR 1976), and Hassebrock (ATR 1977). The Sikora and Milner studies produced conflicting results, but the Hassebrock study showed some skill in forecasting explosive and rapid deepening when 1977 and 1978 tropical cyclones were evaluated. Evaluation of 1979 tropical cyclones again showed that the Hassebrock technique has some skill. Unfortunately, dewpoint data from aircraft reconnaissance missions from earlier years are not readily available at JTWC, so it has been difficult to increase the data base. The Hassebrock study will be applied to 1980 tropical cyclones and any cyclones prior to 1976 for which data are available. The data base may then be large enough to draw some definite conclusions.

A related study of equivalent potential temperature was also started. A comparison was made of past 12- and 24-hour changes in equivalent potential temperature in the eye of a tropical cyclone with the subsequent 12- and 24-hour changes in 700 mb height. These correlations proved inconclusive, again due to the small initial data base. An attempt will be made to obtain more data for this study also.

#### BASIC STREAMLINE ANALYSIS AND TROPICAL CYCLONE FORECASTING TECHNIQUE GUIDE

(Guay, G. A., NAVOCEANCOMCEN/JTWC)

A case study, based on an active tropical cyclone period, is being developed. The study will be worked into a training guide for new forecasters and will include basic streamline analysis procedures as well as tropical cyclone forecasting techniques. The case study will also be integrated into STORMEX training (training scenario for DET 4 HQ AWS, 54 WRS, DET 1 LWW, JTWC, and AJTWC personnel).

#### IMPROVEMENT AND EXTENSION OF THE JTWC CLIMATOLOGY

(Shewchuk, J. D., NAVOCEANCOMCEN/JTWC)

Climatology is an important objective forecast aid for JTWC. A new climatology was developed for the western North Pacific which provides position and intensity forecast information for 24-, 48- and 72-hour intervals. Pertinent statistical information is produced by month for each latitude/longitude of available historical data, which includes 1945 to 1973.

Similar climatological information is being developed for the North and South Indian Oceans and the western South Pacific. The periods of available historical data are 1900-1970, 1900-1969 and 1900-1971, respectively.

## 2. NEPRF RESEARCH

#### TROPICAL CYCLONE RESEARCH AT OR UNDER CONTRACT TO THE NAVAL ENVIRONMENTAL PREDICTION RESEARCH FACILITY (NEPRF), MONTEREY, CALIFORNIA

##### TROPICAL CYCLONE MODELING

(Hodur, R.M., NEPRF and Madala, R., NRL)

A one-way interactive Tropical Cyclone Model (TCM) is being evaluated operationally. This model differs from the original channelled TCM, that has been used for the past three years, in two ways. First, hemispheric forecast data are used on the boundaries as opposed to the channel boundaries used in the original TCM. Second, a new bogus is used to represent the storm based on the observed maximum wind. This latter change has cut the average initial position error by 59% to 15 nm. The one-way interactive TCM average forecast errors at 48, 60 and 72 hr are 8%, 14% and 21% less than the channel model, respectively, for Pacific cyclones through August 1979. Both TCMs have about the same average forecast errors at 12, 24 and 36 hr.

A more sophisticated TCM is being developed jointly by NEPRF and NRL and is expected to become operational in 1981. This TCM includes the effects of surface friction, cumulus clouds and latent and sensible heat transfer from the ocean. Preliminary tests indicate that these improvements may reduce forecast track errors by 15% to 20% when compared to the one-way interactive TCM.

##### TROPICAL CYCLONE WIND DISTRIBUTION

(Tsui, T., Brody, L.R., and Brand, S., NEPRF)

The wind distribution around tropical cyclones for the warnings issued by the JTWC from 1966 through 1977 have been compiled and edited into a unique data set. An analysis of the wind radii shows the asymmetrical nature of the radii of 30 kt and 50 kt winds around tropical cyclones as a function of the characteristics of the storm. A statistical forecast model to predict the asymmetric wind distribution has been developed.

##### TROPICAL CYCLONE STRIKE PROBABILITIES

(Brand, S., NEPRF and Jarrell, J.D., Science Applications Inc.)

Tropical cyclone strike probability is a method for determining probabilities up through 72 hours that a tropical cyclone will come within specified distances around geographic points of interest to the user. This program can be used as an aid for operational decisions associated with tropical cyclone evasion, evacuation and base preparedness. Strike probability output is presently being evaluated by a number of Navy and Air Force meteorologists and operational customers in WESTPAC. Other applications of strike probability that are presently being developed include geographic depictions, wind probabilities and strike probabilities for EASTPAC.

##### A STATISTICALLY DERIVED PREDICTION PROCEDURE FOR TROPICAL CYCLONE GENESIS

(Perrone, T., Lowe, P., Rabe, K., and Brand, S., NEPRF)

A statistical experiment using stepwise discriminant analysis was conducted to determine algorithms to be applied to daily, operationally-available meteorological analyses. Parameters identified as potential predictors of tropical cyclone formation were statistically examined to determine their tropical cyclone genesis prediction capability and were found to possess substantial promise to predict tropical storm formation 24, 48 and 72 hours prior to occurrence.

#### EXTREME SEA STATES WITHIN A TYPHOON

(Rabe, K., and Brand, S., NEPRF)

Extremely high sea states are known to occur to the right of the direction of movement in typhoons. A well-documented case of such extreme sea heights in the western North Pacific was examined and compared with results from a numerical spectral ocean wave model. The wind and sea state field of the numerical model compared favorably with the observed data. An examination was also made to determine how extreme sea states relate to tropical cyclone intensity, forward speed of movement, and circulation size or wind distribution. The results indicated that all three are important with the intensity being the primary factor, speed of movement being of secondary importance and circulation size or wind distribution being the least important factor.

#### TROPICAL CYCLONE ORIGIN, MOVEMENT AND INTENSITY CHARACTERISTICS BASED ON DATA COMPOSITING TECHNIQUES

(Gray, W.M., Colorado State University)

Observational studies using large amounts of composited rawinsonde, satellite and aircraft flight data have been performed to analyze global aspects of tropical cyclone occurrences. The data were used to study the physical processes of tropical cyclone genesis, tropical cyclone intensity changes, environmental factors influencing tropical cyclone turning motion 24-36 hours before the turn takes place, tropical cyclone intensity determination from upper-tropospheric reconnaissance, and the diurnal variations of vertical motion in tropical weather systems.

#### IMPROVED UPPER-LEVEL TROPICAL CYCLONE STEERING TECHNIQUES

(Hamilton, H., Systems and Applied Sciences Corporation)

Current automated objective steering forecast techniques incorporating HATRACK and MOHATT algorithms are operationally termed CYCLOPS and may be run in analysis or prognosis modes at seven different atmospheric levels including 1000 mb, 850 mb, 700 mb, 500 mb, 400 mb, 300 mb and 200 mb. Since tropical cyclones vary greatly in areal and vertical extent and may be representatively steered at varying atmospheric levels dependent on state of development/intensity, continuing research is ongoing which will attempt to identify, given certain tropical cyclone input parameters, a "best" steering level or a "weighted scheme" that takes into account several steering levels.

#### AIRBORNE EXPENDABLE BATHYTHERMOGRAPH OBSERVATIONS IMMEDIATELY BEFORE AND AFTER PASSAGE OF TYPHOON PHYLLIS (AUG 75)

(Schramm, W.G., NEPRF and NAVPGSCOL)

Ocean thermal response to an intense typhoon was analyzed on the basis of data collected during the passage of Typhoon Phyllis (Aug 75) in the Philippine Sea. A unique data set was collected using calibrated Airborne Expendable Bathythermographs dropped from a Navy P-3 aircraft. There were three flights: the first, 14 hours before storm passage, the second 10 hours after passage, and the third two days later. The results indicate a dramatic upward movement of isotherms, relative to the sea surface, in a narrow band under the storm path, with a reversal toward pre-typhoon conditions within three days.

#### MESOSCALE EFFECTS OF TOPOGRAPHY ON TROPICAL CYCLONE ASSOCIATED SURFACE WINDS

(Brand, S. and Chambers, R., NEPRF, Woo, H., Cermak, J., and Lou, I., Colorado State University, and Danard, M., University of Waterloo)

An analysis was made of the influence of topography on tropical cyclone associated strong surface wind conditions for Subic Bay, Republic of the Philippines by means of an environmental wind tunnel. Surface flow patterns were deduced by smoke and surface oil films, while isotach and gust values were obtained by hot wire anemometers. The laboratory results show the significant effects of the mountainous regions surrounding the Subic Bay harbor complex and indicate preferred sheltered locations. The results were compared with synoptic observations and a high resolution (0.19 nm) diagnostic, one-level, primitive equation model. Where direct comparison could be made, all techniques appeared to show qualitative agreement.

#### TYPHOON HAVEN STUDIES

(Stevenson, G.A. and Brand, S., NEPRF)

The Typhoon Havens Research Program, the results of which have been summarized in NEPRF Technical Paper 5-76, has been resumed. COMSEVENTHFLT has identified an additional 12 ports and harbors for evaluation as typhoon havens. Work has commenced on Palau, Saipan and Tinian.

## ANNEX A

## TROPICAL CYCLONE TRACK DATA

## 1. WESTERN NORTH PACIFIC CYCLONE TRACK DATA

TYPHOON ALICE

BEST TRACK				WARNING ERRORS				24 HOUR FORECAST ERRORS				48 HOUR FORECAST ERRORS				72 HOUR FORECAST			
NO/DA/MO	POSIT	WIND	WIND	POSIT	WIND	WIND	WIND	POSIT	WIND	WIND	WIND	POSIT	WIND	WIND	WIND	POSIT	WIND	WIND	WIND
0101007	2.5 170.7	20	0.0	0.0	0.0	-0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
0101007	3.1 170.1	25	0.0	0.0	0.0	-0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
0101122	3.9 149.4	30	0.0	0.0	0.0	-0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
0101107	4.6 149.2	35	4.4	168.7	25	32	-10	6.0	164.4	30	125	24	7.7	161.3	25	409	-15	4.3	146.9
0102007	5.2 148.7	40	5.1	168.4	45	13	5	7.1	164.4	35	213	4	7.4	159.7	30	445	5	4.4	145.2
0102007	5.7 148.2	45	5.4	167.4	50	25	5	7.1	164.4	35	240	4	7.4	159.5	30	445	5	4.3	144.9
0102122	6.2 147.8	50	6.5	166.4	50	85	0	7.7	161.9	30	378	10	8.1	157.2	25	571	10	9.2	142.3
0102102	6.7 147.7	55	6.9	167.7	55	12	0	9.2	164.4	35	160	14	10.7	161.7	35	243	10	11.6	147.0
0103007	7.2 148.0	55	7.2	167.4	55	30	0	9.3	164.7	35	130	10	10.4	161.6	30	214	15	11.6	146.5
0103007	8.0 148.3	50	7.9	168.4	55	8	5	10.4	160.4	35	123	10	14.1	169.9	35	415	5	17.6	140.7
0103127	8.5 148.2	50	8.9	168.9	55	44	5	12.2	164.0	35	201	10	14.7	169.0	35	443	0	14.9	141.3
0103102	8.9 148.1	50	9.4	168.0	55	42	5	12.9	167.7	35	220	10	14.3	169.5	35	479	0	14.8	141.0
0104002	9.2 148.0	55	9.3	167.8	50	13	-5	10.9	164.0	35	99	4	12.7	162.6	30	46	-10	13.0	138.6
0104007	9.4 147.8	55	9.4	167.4	50	17	-5	10.9	164.1	35	123	4	12.3	162.7	30	170	-15	13.1	138.8
0104122	9.5 146.4	55	9.7	167.0	50	17	-5	10.9	164.7	35	84	10	12.3	160.9	30	49	-20	13.4	137.1
0104102	9.5 146.1	55	9.5	165.0	50	6	-5	10.2	161.0	35	53	10	10.4	158.0	30	91	-25	11.4	134.0
0105007	9.5 145.1	55	9.4	165.0	50	4	-5	10.3	161.1	35	59	10	11.4	157.2	30	49	-30	11.8	133.1
0105007	9.7 144.4	50	9.7	164.1	55	14	-5	10.4	160.1	30	72	10	11.7	156.2	30	43	-35	12.0	132.2
0105122	10.0 143.4	45	10.1	163.2	55	24	-10	10.7	159.7	30	74	10	11.4	155.3	30	43	-40	12.0	131.3
0105102	10.6 142.7	45	10.4	162.7	55	0	-10	11.1	159.1	30	68	10	11.4	155.4	30	73	-35	11.9	131.6
0106002	11.1 141.7	40	11.2	161.7	55	6	-15	12.7	154.0	35	27	10	12.4	153.7	30	51	-40	12.0	129.0
0106007	11.6 140.4	35	11.9	160.4	50	17	-5	13.4	154.7	35	78	10	13.0	152.8	30	97	-5	12.0	128.6
0106122	12.0 139.4	30	12.0	159.4	75	0	-5	13.4	154.9	30	80	10	13.4	150.4	30	96	10	12.9	126.3
0106102	12.2 138.4	30	12.3	158.7	80	19	-5	13.4	154.2	30	73	10	13.7	149.8	30	91	15	12.4	125.0
0107002	12.3 137.4	30	12.3	157.4	85	12	-5	12.0	152.7	35	70	10	13.4	150.1	30	105	25	11.4	124.1
0107002	12.3 136.4	35	12.3	156.7	90	6	-5	11.4	152.9	35	83	4	11.4	148.9	30	119	35	11.4	124.8
0107122	12.3 135.4	40	12.2	155.4	95	19	-5	11.9	151.4	35	94	20	11.5	147.8	30	145	45	11.5	123.8
0107102	12.2 134.4	40	12.5	154.0	105	29	0	12.2	149.3	35	25	30	12.0	144.0	30	12	45	11.5	123.1
0108002	12.1 133.0	35	12.2	153.1	110	4	0	12.0	144.7	30	19	40	12.0	143.1	30	13	45	12.0	122.0
0108002	12.0 131.4	30	12.0	151.7	115	12	15	11.9	144.4	30	13	40	11.9	141.0	30	43	35	12.0	121.5
0108122	12.0 130.7	30	12.0	150.4	115	18	25	11.4	144.3	30	19	50	11.9	140.0	30	39	35	12.0	120.7
0108102	11.9 129.0	30	11.9	149.1	105	5	20	11.4	143.9	30	21	25	12.0	138.6	30	71	10	11.5	120.0
0109002	11.9 127.0	30	11.9	147.7	100	13	20	11.7	142.5	30	30	15	11.9	137.3	30	98	-5	12.0	121.9
0109002	12.1 126.4	35	11.9	146.5	95	19	20	11.7	141.4	35	25	4	11.9	136.4	30	121	-15	12.0	121.3
0109122	12.1 125.4	40	12.0	145.7	90	13	20	12.1	139.9	35	41	-5	12.3	134.6	30	192	-30	12.4	120.3
0109102	12.0 124.7	40	12.1	144.0	80	13	5	12.2	138.7	30	64	-15	12.2	133.4	30	255	-40	12.4	120.1
0110002	11.8 123.0	35	11.9	143.0	80	6	5	11.9	137.9	30	66	-20	12.2	132.7	30	282	-40	12.5	127.4
0110002	12.1 121.7	30	12.1	141.5	75	12	-5	12.0	136.7	35	129	-30	12.2	131.0	30	367	-45	12.7	125.9
0110122	12.2 120.4	30	12.2	140.1	75	29	-5	12.1	134.6	35	190	-30	12.4	129.4	30	435	-35	12.8	124.5
0110102	12.2 119.4	35	12.2	139.0	85	47	0	12.2	133.4	35	233	-14	12.4	128.7	30	478	-5	12.9	123.4
0111002	12.4 118.0	40	12.3	138.0	85	4	-5	12.2	132.4	35	241	-14	12.1	132.8	30	706	5	12.5	128.0
0111002	12.7 116.7	45	12.5	137.0	90	26	-5	12.2	131.7	40	198	-20	12.2	129.4	30	485	15	12.2	124.8
0111122	13.1 117.4	50	13.0	137.7	95	9	0	13.4	134.7	40	79	0	12.4	132.2	30	355	35	12.4	124.8
0111102	13.4 117.4	50	13.3	137.1	95	30	-5	13.1	134.7	40	146	0	12.4	132.9	30	308	30	12.4	124.8
0112002	13.7 117.3	50	13.9	137.2	90	8	-10	15.4	137.4	40	52	10	14.2	140.0	30	275	40	14.0	124.0
0112002	14.1 117.0	50	14.2	136.9	90	8	-10	16.2	137.2	40	29	15	14.5	140.0	30	273	40	14.0	124.0
0112122	14.5 116.4	50	15.2	136.4	85	43	-5	17.4	137.4	40	83	20	14.0	140.0	30	0	0	14.0	124.0
0112102	15.0 116.4	50	15.2	136.4	80	12	0	17.4	137.9	40	93	20	14.0	140.0	30	0	0	14.0	124.0
0113002	15.4 116.4	50	15.5	136.4	80	8	10	17.4	138.0	40	124	30	14.0	140.0	30	0	0	14.0	124.0
0113002	15.8 116.4	55	15.9	136.7	70	13	15	18.1	138.4	55	194	35	14.0	140.0	30	0	0	14.0	124.0
0113127	16.1 117.3	60	16.1	137.2	65	6	20	18.0	138.0	60	0	0	14.0	140.0	30	0	0	14.0	124.0
0113102	16.1 117.0	60	16.4	137.4	55	34	15	18.0	138.0	60	0	0	14.0	140.0	30	0	0	14.0	124.0
0114002	16.1 116.4	60	16.1	136.4	45	0	15	18.0	138.0	60	0	0	14.0	140.0	30	0	0	14.0	124.0
0114002	16.0 116.0	60	16.0	136.0	30	0	10	18.0	138.0	60	0	0	14.0	140.0	30	0	0	14.0	124.0

AVG FORECAST POSIT ERROR  
AVG HIGH ANGLE ERROR  
AVG INTENSITY MAGNITUDE ERROR  
AVG INTENSITY BTAS  
NUMBER OF FORECASTS

ALL FORECASTS  
24-HR 48-HR 72-HR  
18 105 222 314  
11 43 173 271  
4 17 23 23  
2 2 1 -3  
51 47 43 39

Preceding Page BLANK - NO FILM

TYPHOON BESS

RFST TRACK				VARNING				24 HOUR FORECAST				48 HOUR FORECAST				72 HOUR FORECAST			
MO/JA/HA	POSIT	WIND	POSIT	WIND	DST	WIND	POSIT	WIND	DST	WIND	POSIT	WIND	DST	WIND	POSIT	WIND	DST	WIND	
031800Z	7.1 150.0	15	0.0 0.0	0	-0.0	0	0.0 0.0	0	-0.0	0	0.0 0.0	0	-0.0	0	0.0 0.0	0	-0.0	0	
031806Z	7.8 149.1	15	0.0 0.0	0	-0.0	0	0.0 0.0	0	-0.0	0	0.0 0.0	0	-0.0	0	0.0 0.0	0	-0.0	0	
031812Z	8.6 147.9	15	0.0 0.0	0	-0.0	0	0.0 0.0	0	-0.0	0	0.0 0.0	0	-0.0	0	0.0 0.0	0	-0.0	0	
031818Z	9.3 146.7	15	0.0 0.0	0	-0.0	0	0.0 0.0	0	-0.0	0	0.0 0.0	0	-0.0	0	0.0 0.0	0	-0.0	0	
031900Z	9.8 145.4	20	0.0 0.0	0	-0.0	0	0.0 0.0	0	-0.0	0	0.0 0.0	0	-0.0	0	0.0 0.0	0	-0.0	0	
031906Z	10.2 144.4	20	0.0 0.0	0	-0.0	0	0.0 0.0	0	-0.0	0	0.0 0.0	0	-0.0	0	0.0 0.0	0	-0.0	0	
031912Z	10.4 143.7	20	0.0 0.0	0	-0.0	0	0.0 0.0	0	-0.0	0	0.0 0.0	0	-0.0	0	0.0 0.0	0	-0.0	0	
031918Z	10.6 142.7	25	0.0 0.0	0	-0.0	0	0.0 0.0	0	-0.0	0	0.0 0.0	0	-0.0	0	0.0 0.0	0	-0.0	0	
032000Z	10.5 141.7	30	10.9 141.0	25	27	-5	11.4 134.4	30	13	0	11.4 135.3	40	11.5	-15	11.9 141.7	50	10.5	-25	
032006Z	10.6 140.7	30	10.6 140.4	30	12	0	10.4 134.0	35	14	-5	10.4 131.5	45	14.3	-15	10.9 147.8	55	14.3	-25	
032012Z	10.7 139.9	30	10.5 139.4	30	13	0	10.4 134.4	35	12	0	10.4 131.4	45	10.7	-25	10.9 147.0	55	14.4	-30	
032018Z	11.0 139.2	30	11.0 139.0	30	17	0	11.7 134.4	30	10	0	12.4 132.4	40	11.3	-35	14.0 140.4	45	14.0	-45	
032100Z	11.7 138.4	30	11.2 138.7	30	35	0	11.0 134.1	35	10	0	12.4 132.5	40	14.0	-35	14.1 140.0	45	14.0	-45	
032106Z	12.3 138.0	40	12.3 138.2	35	12	-5	14.7 137.0	45	10.5	0	14.4 137.4	35	17.0	-45	14.0 144.1	30	7.0	-40	
032112Z	12.8 136.0	45	12.4 137.5	40	35	-5	15.3 136.4	50	11.0	0	17.4 138.0	45	11.4	-40	20.2 140.4	35	4.1	-25	
032118Z	13.3 136.1	50	13.6 136.1	45	18	-5	17.0 134.4	50	10	0	10.3 138.4	45	12	-45	20.9 142.3	35	4.6	0	
032200Z	13.7 135.4	55	14.1 135.1	55	34	0	17.2 133.0	55	11	0	20.0 134.5	60	14.3	-30	21.4 140.4	45	14.0	20	
032206Z	14.1 135.3	60	14.0 135.4	60	13	0	16.0 134.0	75	9	-5	17.4 133.1	80	17.5	-10	0.0 0.0	0	-0.0	0	
032212Z	14.7 135.0	70	14.6 134.9	70	9	0	16.4 133.3	85	17.4	0	18.7 133.3	90	44.1	30	0.0 0.0	0	-0.0	0	
032218Z	15.3 134.4	75	15.1 134.6	75	17	0	16.0 133.4	90	21	0	10.3 134.1	80	44.6	45	0.0 0.0	0	-0.0	0	
032300Z	16.1 134.7	75	15.4 134.7	75	14	0	18.0 134.7	85	20	-5	20.7 136.8	75	44.0	50	0.0 0.0	0	-0.0	0	
032306Z	17.0 135.2	80	17.0 134.8	80	23	0	20.3 134.5	80	15	0	0.0 0.0	0	-0.0	0	0.0 0.0	0	-0.0	0	
032312Z	17.8 136.0	85	17.7 136.2	80	13	-5	20.4 140.7	60	36	0	0.0 0.0	0	-0.0	0	0.0 0.0	0	-0.0	0	
032318Z	18.7 136.9	90	18.3 137.1	80	25	-10	21.4 142.1	50	34	14	0.0 0.0	0	-0.0	0	0.0 0.0	0	-0.0	0	
032400Z	19.5 137.0	90	19.5 137.4	85	6	-5	22.4 142.4	50	35	25	0.0 0.0	0	-0.0	0	0.0 0.0	0	-0.0	0	
032406Z	20.3 139.2	90	20.3 139.1	75	6	-15	0.0 0.0	0	-0	0	0.0 0.0	0	-0.0	0	0.0 0.0	0	-0.0	0	
032412Z	21.2 140.4	90	21.3 140.4	75	13	15	0.0 0.0	0	-0	0	0.0 0.0	0	-0.0	0	0.0 0.0	0	-0.0	0	
032418Z	22.0 142.3	95	22.1 141.9	65	23	30	0.0 0.0	0	-0	0	0.0 0.0	0	-0.0	0	0.0 0.0	0	-0.0	0	
032500Z	22.9 144.3	25	23.4 143.4	30	41	5	0.0 0.0	0	-0	0	0.0 0.0	0	-0.0	0	0.0 0.0	0	-0.0	0	

ALL FORECASTS				
MMHG	24-HR	48-HR	72-HR	
AVG FORECAST POSIT ERROR	19.	114.	285.	344.
AVG WIND ANGLE ERROR	15.	73.	164.	240.
AVG INTENSITY MAGNITUDE ERROR	5.	10.	32.	71.
AVG INTENSITY BIAS	-0.	-6.	-13.	-24.
NUMBER OF FORECASTS	21	17	13	9

# TYPHOON CECIL

BEST TRACK				WARNING				24 HOUR FORECAST				48 HOUR FORECAST				72 HOUR FORECAST			
NO/JA/HR	POSIT	WIND	PSST	WIND	PSST	WIND	PSST	POSIT	WIND	PSST	WIND	POSIT	WIND	PSST	WIND	POSIT	WIND	PSST	WIND
040800Z	3.3 143.4	15	0.0	0.0	0.0	-0.0	0.0	0.0	0.0	0.0	-0.0	0.0	0.0	0.0	-0.0	0.0	0.0	0.0	-0.0
040805Z	3.4 143.4	15	0.0	0.0	0.0	-0.0	0.0	0.0	0.0	0.0	-0.0	0.0	0.0	0.0	-0.0	0.0	0.0	0.0	-0.0
040812Z	3.6 143.4	15	0.0	0.0	0.0	-0.0	0.0	0.0	0.0	0.0	-0.0	0.0	0.0	0.0	-0.0	0.0	0.0	0.0	-0.0
040818Z	3.8 143.1	15	0.0	0.0	0.0	-0.0	0.0	0.0	0.0	0.0	-0.0	0.0	0.0	0.0	-0.0	0.0	0.0	0.0	-0.0
040900Z	4.2 142.4	15	0.0	0.0	0.0	-0.0	0.0	0.0	0.0	0.0	-0.0	0.0	0.0	0.0	-0.0	0.0	0.0	0.0	-0.0
040905Z	4.6 142.5	15	0.0	0.0	0.0	-0.0	0.0	0.0	0.0	0.0	-0.0	0.0	0.0	0.0	-0.0	0.0	0.0	0.0	-0.0
040912Z	5.1 142.2	15	0.0	0.0	0.0	-0.0	0.0	0.0	0.0	0.0	-0.0	0.0	0.0	0.0	-0.0	0.0	0.0	0.0	-0.0
040918Z	5.5 141.9	20	0.0	0.0	0.0	-0.0	0.0	0.0	0.0	0.0	-0.0	0.0	0.0	0.0	-0.0	0.0	0.0	0.0	-0.0
041000Z	5.7 141.5	20	0.0	0.0	0.0	-0.0	0.0	0.0	0.0	0.0	-0.0	0.0	0.0	0.0	-0.0	0.0	0.0	0.0	-0.0
041005Z	5.9 141.1	20	0.0	0.0	0.0	-0.0	0.0	0.0	0.0	0.0	-0.0	0.0	0.0	0.0	-0.0	0.0	0.0	0.0	-0.0
041012Z	6.1 140.4	25	0.0	0.0	0.0	-0.0	0.0	0.0	0.0	0.0	-0.0	0.0	0.0	0.0	-0.0	0.0	0.0	0.0	-0.0
041018Z	6.2 140.2	25	0.0	0.0	0.0	-0.0	0.0	0.0	0.0	0.0	-0.0	0.0	0.0	0.0	-0.0	0.0	0.0	0.0	-0.0
041100Z	6.4 139.5	30	6.3 139.7	30	13.0	0.0	7.1 137.7	35	0.0	0.0	0.0	6.1 134.2	40	50.0	-5.0	4.2 131.2	50.0	4.4	-5.0
041105Z	6.5 139.0	30	6.5 139.0	30	0.0	0.0	7.1 134.4	40	30.0	0.0	0.0	6.4 133.5	45	50.0	0.0	4.5 130.5	55.0	4.7	0.0
041112Z	6.7 138.4	30	6.5 138.4	30	17.0	0.0	7.1 134.3	40	20.0	0.0	0.0	6.2 133.7	45	21.0	0.0	4.3 130.7	55.0	4.5	-10.0
041118Z	6.9 137.4	30	6.5 138.0	30	27.0	0.0	7.1 134.4	40	0.0	0.0	0.0	6.4 132.8	50.0	27.0	0.0	4.7 129.7	60.0	4.6	-10.0
041200Z	7.0 137.3	35	7.2 137.2	35	13.0	0.0	8.2 134.5	50	45.0	0.0	0.0	6.2 131.5	60.0	54.0	5.0	4.9 129.5	70.0	4.6	-5.0
041205Z	6.8 136.7	40	7.2 136.4	40	27.0	0.0	8.0 134.5	55	45.0	10.0	0.0	6.4 130.4	65.0	70.0	10.0	4.8 127.4	75.0	4.6	0.0
041212Z	7.0 136.0	40	7.0 136.2	40	12.0	0.0	7.4 134.0	55	43.0	10.0	0.0	6.5 131.4	65.0	124.0	0.0	4.6 129.4	75.0	4.6	-5.0
041218Z	7.2 135.5	45	7.0 135.5	45	12.0	0.0	7.7 133.3	55	51.0	0.0	0.0	6.4 130.6	65.0	133.0	-5.0	4.2 127.5	75.0	4.6	-5.0
041300Z	7.5 134.8	45	7.2 134.0	45	19.0	0.0	7.8 132.4	55	50.0	0.0	0.0	6.6 129.7	65.0	138.0	-10.0	4.5 125.5	75.0	4.6	5.0
041305Z	7.7 134.2	45	7.5 134.4	45	13.0	0.0	8.3 131.9	55	89.0	0.0	0.0	6.2 129.2	65.0	143.0	-10.0	10.0 126.0	75.0	4.6	10.0
041312Z	8.0 133.4	45	8.0 133.5	45	5.0	0.0	8.0 131.0	55	103.0	-10.0	0.0	6.4 128.5	65.0	201.0	-15.0	10.0 125.2	60.0	4.6	0.0
041318Z	8.2 132.4	50	8.3 132.0	45	19.0	-5.0	9.1 130.0	55	95.0	-15.0	0.0	6.4 126.8	65.0	174.0	-10.0	11.0 124.0	50.0	4.6	-10.0
041400Z	8.3 131.4	55	8.3 131.4	55	0.0	0.0	9.3 124.1	65	30.0	-10.0	0.0	6.7 124.4	50.0	105.0	-10.0	12.4 120.9	50.0	4.1	-5.0
041405Z	8.4 130.4	55	8.3 130.4	55	13.0	0.0	9.5 124.7	65	30.0	-10.0	0.0	6.6 123.2	55.0	113.0	-10.0	11.7 119.3	55.0	4.1	-5.0
041412Z	8.5 129.7	65	8.5 129.7	65	5.0	0.0	9.8 124.1	75	62.0	-5.0	0.0	6.6 121.7	60.0	100.0	0.0	12.1 117.4	65.0	4.0	15.0
041418Z	8.9 129.4	70	8.6 129.2	70	21.0	0.0	9.7 124.2	75	108.0	-10.0	0.0	6.7 120.8	60.0	132.0	0.0	12.4 115.4	65.0	4.1	15.0
041500Z	9.4 127.5	75	9.1 127.5	75	19.0	0.0	10.3 124.3	70	120.0	0.0	0.0	6.6 120.9	65.0	123.0	10.0	12.8 117.2	70.0	4.0	25.0
041505Z	10.1 126.5	75	10.0 126.4	75	9.0	0.0	11.0 123.1	60	42.0	-5.0	0.0	6.7 119.6	65.0	140.0	10.0	13.8 115.6	70.0	4.0	25.0
041512Z	10.8 125.4	80	10.7 125.4	80	6.0	0.0	12.3 121.8	60	33.0	0.0	0.0	6.4 118.1	65.0	247.0	15.0	14.3 114.7	70.0	4.0	25.0
041518Z	11.5 124.4	75	11.5 124.4	75	0.0	0.0	12.0 120.5	60	93.0	0.0	0.0	6.4 116.6	70.0	340.0	20.0	17.2 114.9	75.0	4.0	25.0
041600Z	12.0 123.2	70	11.9 123.2	70	6.0	0.0	13.1 119.3	65	163.0	10.0	0.0	6.4 115.9	70.0	415.0	25.0	14.5 114.5	75.0	4.0	25.0
041605Z	12.4 122.4	65	12.2 122.4	65	17.0	0.0	13.5 114.4	65	210.0	10.0	0.0	6.1 115.4	70.0	473.0	25.0	14.2 115.4	75.0	4.0	25.0
041612Z	12.7 122.2	60	12.8 122.0	60	13.0	0.0	14.0 114.4	65	226.0	15.0	0.0	6.6 115.8	70.0	472.0	25.0	17.9 115.3	75.0	4.0	25.0
041618Z	12.9 122.1	60	13.0 121.5	60	35.0	0.0	14.2 114.4	65	250.0	15.0	0.0	6.4 115.8	70.0	494.0	25.0	14.3 116.2	75.0	4.0	25.0
041700Z	13.1 122.1	55	12.9 122.0	55	13.0	0.0	13.7 120.9	50	130.0	0.0	0.0	6.4 119.3	50.0	349.0	0.0	14.1 120.5	50.0	4.0	25.0
041705Z	13.5 122.3	55	13.3 122.2	55	13.0	0.0	13.8 121.5	50	141.0	0.0	0.0	6.4 120.0	50.0	379.0	0.0	14.5 119.3	50.0	4.0	25.0
041712Z	13.9 122.4	50	13.9 122.4	50	4.0	0.0	16.0 122.4	50	73.0	0.0	0.0	6.1 124.0	50.0	135.0	5.0	12.2 127.7	60.0	3.9	10.0
041718Z	14.3 122.4	50	14.3 122.4	50	17.0	0.0	16.4 121.0	50	80.0	0.0	0.0	6.4 125.3	50.0	156.0	5.0	10.7 124.3	60.0	4.0	15.0
041800Z	14.6 123.1	45	14.6 123.1	45	0.0	0.0	16.2 124.4	55	48.0	0.0	0.0	6.2 129.0	60.0	147.0	15.0	10.6 143.7	60.0	4.0	15.0
041805Z	15.0 123.4	45	15.0 123.4	45	12.0	0.0	16.7 124.3	55	50.0	0.0	0.0	6.4 130.4	50.0	197.0	20.0	0.0 0.0	0.0	0.0	0.0
041812Z	15.6 124.0	45	15.6 124.1	45	6.0	0.0	17.0 127.1	55	20.0	0.0	0.0	6.4 131.7	50.0	149.0	30.0	0.0 0.0	0.0	0.0	0.0
041818Z	16.3 124.4	45	15.9 124.4	45	33.0	0.0	17.9 127.9	55	102.0	0.0	0.0	6.1 132.8	50.0	195.0	25.0	0.0 0.0	0.0	0.0	0.0
041900Z	16.9 125.0	50	16.8 125.1	50	4.0	0.0	19.2 124.9	55	108.0	10.0	0.0	6.1 133.8	50.0	192.0	25.0	0.0 0.0	0.0	0.0	0.0
041905Z	17.5 125.8	50	17.6 125.0	50	8.0	0.0	19.0 130.1	55	132.0	15.0	0.0	0.0 0.0	0.0	-0.0	0.0	0.0 0.0	0.0	0.0	0.0
041912Z	18.2 127.0	50	17.9 126.7	55	29.0	5.0	20.0 131.2	50	180.0	20.0	0.0	0.0 0.0	0.0	-0.0	0.0	0.0 0.0	0.0	0.0	0.0
041918Z	19.6 127.8	50	19.6 127.4	50	11.0	0.0	23.8 134.7	40	51.0	15.0	0.0	0.0 0.0	0.0	-0.0	0.0	0.0 0.0	0.0	0.0	0.0
042000Z	21.0 129.1	45	21.1 129.1	50	5.0	0.0	24.4 134.4	35	90.0	10.0	0.0	0.0 0.0	0.0	-0.0	0.0	0.0 0.0	0.0	0.0	0.0
042005Z	22.1 130.4	40	21.4 130.9	50	24.0	10.0	0.0 0.0	0.0	-0.0	0.0	0.0	0.0 0.0	0.0	-0.0	0.0	0.0 0.0	0.0	0.0	0.0
042012Z	22.8 132.4	30	22.8 132.4	45	22.0	15.0	0.0 0.0	0.0	-0.0	0.0	0.0	0.0 0.0	0.0	-0.0	0.0	0.0 0.0	0.0	0.0	0.0
042018Z	23.0 134.4	25	24.0 134.0	30	64.0	5.0	0.0 0.0	0.0	-0.0	0.0	0.0	0.0 0.0	0.0	-0.0	0.0	0.0 0.0	0.0	0.0	0.0
042100Z	23.0 136.4	25	0.0 0.0	0.0	-0.0	0.0	0.0 0.0	0.0	-0.0	0.0	0.0	0.0 0.0	0.0	-0.0	0.0	0.0 0.0	0.0	0.0	0.0

## ALL FORECASTS

	15	24	48	72
AVG FORECAST POSIT ERROR	15	27	191	320
AVG RIGHT ANGLE ERROR	11	62	131	215
AVG INTENSITY MAGNITUDE ERROR	1	7	11	14
AVG INTENSITY RTAS	1	3	7	11
NUMBER OF FORECASTS	40	37	33	29

## TROPICAL STORM DOT

BEST TRACK				ANALYSIS				24 HOUR FORECAST				48 HOUR FORECAST				72 HOUR FORECAST			
NO/00/HR	POSIT	WIND	PRST	WIND	PRST	WIND	PRST	WIND	PRST	WIND	PRST	WIND	PRST	WIND	PRST	WIND	PRST	WIND	PRST
050000Z	4.0 147.5	15	0.0 0.0	0	-0.0 0	0.0 0.0	0	-0.0 0	0.0 0.0	0	-0.0 0	0.0 0.0	0	-0.0 0	0.0 0.0	0	-0.0 0	0.0 0.0	0
050006Z	4.0 146.5	15	0.0 0.0	0	-0.0 0	0.0 0.0	0	-0.0 0	0.0 0.0	0	-0.0 0	0.0 0.0	0	-0.0 0	0.0 0.0	0	-0.0 0	0.0 0.0	0
050012Z	4.1 145.4	15	0.0 0.0	0	-0.0 0	0.0 0.0	0	-0.0 0	0.0 0.0	0	-0.0 0	0.0 0.0	0	-0.0 0	0.0 0.0	0	-0.0 0	0.0 0.0	0
050018Z	4.2 144.4	15	0.0 0.0	0	-0.0 0	0.0 0.0	0	-0.0 0	0.0 0.0	0	-0.0 0	0.0 0.0	0	-0.0 0	0.0 0.0	0	-0.0 0	0.0 0.0	0
050024Z	4.3 143.3	15	0.0 0.0	0	-0.0 0	0.0 0.0	0	-0.0 0	0.0 0.0	0	-0.0 0	0.0 0.0	0	-0.0 0	0.0 0.0	0	-0.0 0	0.0 0.0	0
050030Z	4.5 142.1	15	0.0 0.0	0	-0.0 0	0.0 0.0	0	-0.0 0	0.0 0.0	0	-0.0 0	0.0 0.0	0	-0.0 0	0.0 0.0	0	-0.0 0	0.0 0.0	0
050036Z	4.9 141.1	15	0.0 0.0	0	-0.0 0	0.0 0.0	0	-0.0 0	0.0 0.0	0	-0.0 0	0.0 0.0	0	-0.0 0	0.0 0.0	0	-0.0 0	0.0 0.0	0
050042Z	5.3 139.4	20	0.0 0.0	0	-0.0 0	0.0 0.0	0	-0.0 0	0.0 0.0	0	-0.0 0	0.0 0.0	0	-0.0 0	0.0 0.0	0	-0.0 0	0.0 0.0	0
050048Z	5.2 138.4	20	0.0 0.0	0	-0.0 0	0.0 0.0	0	-0.0 0	0.0 0.0	0	-0.0 0	0.0 0.0	0	-0.0 0	0.0 0.0	0	-0.0 0	0.0 0.0	0
050054Z	4.8 136.4	20	0.0 0.0	0	-0.0 0	0.0 0.0	0	-0.0 0	0.0 0.0	0	-0.0 0	0.0 0.0	0	-0.0 0	0.0 0.0	0	-0.0 0	0.0 0.0	0
050100Z	4.4 135.4	20	0.0 0.0	0	-0.0 0	0.0 0.0	0	-0.0 0	0.0 0.0	0	-0.0 0	0.0 0.0	0	-0.0 0	0.0 0.0	0	-0.0 0	0.0 0.0	0
050106Z	4.5 134.5	20	0.0 0.0	0	-0.0 0	0.0 0.0	0	-0.0 0	0.0 0.0	0	-0.0 0	0.0 0.0	0	-0.0 0	0.0 0.0	0	-0.0 0	0.0 0.0	0
050112Z	5.0 134.2	25	0.0 0.0	0	-0.0 0	0.0 0.0	0	-0.0 0	0.0 0.0	0	-0.0 0	0.0 0.0	0	-0.0 0	0.0 0.0	0	-0.0 0	0.0 0.0	0
050118Z	5.8 133.0	25	0.0 0.0	0	-0.0 0	0.0 0.0	0	-0.0 0	0.0 0.0	0	-0.0 0	0.0 0.0	0	-0.0 0	0.0 0.0	0	-0.0 0	0.0 0.0	0
050124Z	6.7 132.4	25	0.0 0.0	0	-0.0 0	0.0 0.0	0	-0.0 0	0.0 0.0	0	-0.0 0	0.0 0.0	0	-0.0 0	0.0 0.0	0	-0.0 0	0.0 0.0	0
050130Z	7.3 132.2	25	0.0 0.0	0	-0.0 0	0.0 0.0	0	-0.0 0	0.0 0.0	0	-0.0 0	0.0 0.0	0	-0.0 0	0.0 0.0	0	-0.0 0	0.0 0.0	0
051000Z	7.7 132.0	25	0.0 0.0	0	-0.0 0	0.0 0.0	0	-0.0 0	0.0 0.0	0	-0.0 0	0.0 0.0	0	-0.0 0	0.0 0.0	0	-0.0 0	0.0 0.0	0
051006Z	8.2 130.4	30	8.2 130.4	20	14	-10	9.4 127.0	25	130	11.4 123.2	20	142	-10	12.5 119.3	25	6	-4		
051012Z	8.7 129.0	30	8.4 129.4	25	30	-5	10.5 125.4	30	123	11.4 121.6	20	116	-10	13.0 117.7	25	111	-10		
051018Z	8.9 127.3	30	9.4 127.0	25	46	-5	11.2 121.4	25	102	12.4 119.7	25	43	-5	15.0 116.5	35	219	-5		
051024Z	9.3 126.0	30	9.0 125.4	25	30	-5	10.7 120.3	25	85	12.1 116.8	30	142	0	14.6 115.9	35	255	-4		
051030Z	9.7 124.7	25	9.4 124.0	25	13	0	10.5 119.4	25	47	12.4 116.6	30	143	0	15.2 115.8	35	298	0		
051036Z	9.9 123.4	25	9.9 123.4	25	0	0	10.7 118.3	25	30	13.1 115.1	30	242	-5	15.8 113.3	40	474	15		
051042Z	10.2 122.2	25	10.2 122.2	25	0	0	11.1 117.3	25	134	13.4 114.4	35	370	-5	16.7 113.0	45	431	20		
051048Z	10.4 121.4	25	10.5 121.4	25	9	0	12.1 117.2	30	129	14.4 114.4	40	379	0	17.5 114.4	50	441	25		
051054Z	10.5 120.4	30	10.5 120.4	25	29	-5	12.4 116.4	35	175	15.4 114.5	45	375	10	18.5 116.4	50	440	25		
051100Z	10.9 119.0	30	10.7 119.1	25	44	-5	12.0 115.4	35	245	16.3 114.3	45	474	20	19.0 116.6	50	459	25		
051106Z	11.7 119.6	30	11.4 118.0	30	36	-0	15.0 117.0	40	193	18.5 118.6	50	299	25	20.6 122.5	50	240	25		
051112Z	12.2 119.4	30	12.5 118.7	30	45	0	15.1 117.7	40	167	18.3 119.1	50	277	25	21.0 123.2	50	245	25		
051118Z	12.5 119.4	30	12.6 118.7	30	41	0	14.3 117.4	40	169	17.1 118.1	50	311	25	20.0 121.4	50	241	25		
051124Z	13.0 119.4	35	13.1 119.2	35	24	0	15.7 116.4	40	134	18.4 120.7	50	218	25	21.1 124.6	40	255	15		
051130Z	13.4 119.0	40	13.7 119.3	35	30	-5	16.0 119.7	40	154	18.4 121.3	45	241	20	21.5 125.1	35	299	10		
051136Z	13.7 120.2	40	13.7 120.2	40	0	0	15.4 121.4	25	80	17.2 124.2	40	119	15	19.8 128.0	45	713	20		
051142Z	14.0 120.0	34	14.0 120.4	35	12	0	15.4 122.4	30	24	17.7 125.7	45	121	20	0.0 0.0	0	-0.0 0			
051148Z	14.4 121.4	25	14.2 120.0	25	31	0	15.4 122.4	30	80	17.4 125.5	40	244	15	0.0 0.0	0	-0.0 0			
051154Z	14.7 122.0	25	14.5 121.4	25	31	0	16.0 124.4	30	95	18.3 126.5	40	307	15	0.0 0.0	0	-0.0 0			
051200Z	15.1 122.4	25	15.2 122.7	25	4	0	16.4 124.7	30	104	18.4 127.5	35	345	10	0.0 0.0	0	-0.0 0			
051206Z	15.6 123.3	25	15.4 123.2	25	13	0	17.1 124.1	30	170	0.0 0.0	0	-0.0 0	0	0.0 0.0	0	-0.0 0			
051212Z	16.2 124.1	25	16.2 124.0	25	6	0	18.4 124.7	30	161	0.0 0.0	0	-0.0 0	0	0.0 0.0	0	-0.0 0			
051218Z	17.0 125.1	25	16.7 124.4	25	25	0	18.0 127.4	30	225	0.0 0.0	0	-0.0 0	0	0.0 0.0	0	-0.0 0			
051224Z	17.8 126.2	25	17.6 125.0	25	21	0	0.0 0.0	0	-0.0 0	0.0 0.0	0	-0.0 0	0	0.0 0.0	0	-0.0 0			
051230Z	18.8 127.4	25	0.0 0.0	0	-0.0 0	0.0 0.0	0	-0.0 0	0.0 0.0	0	-0.0 0	0	-0.0 0	0	0.0 0.0	0	-0.0 0		
051236Z	20.0 129.0	25	0.0 0.0	0	-0.0 0	0.0 0.0	0	-0.0 0	0.0 0.0	0	-0.0 0	0	-0.0 0	0	0.0 0.0	0	-0.0 0		
051242Z	21.2 131.0	25	0.0 0.0	0	-0.0 0	0.0 0.0	0	-0.0 0	0.0 0.0	0	-0.0 0	0	-0.0 0	0	0.0 0.0	0	-0.0 0		
051248Z	22.2 133.0	25	0.0 0.0	0	-0.0 0	0.0 0.0	0	-0.0 0	0.0 0.0	0	-0.0 0	0	-0.0 0	0	0.0 0.0	0	-0.0 0		

ALL FORECASTS				
WIND	24-HR	48-HR	72-HR	
AVG FORECAST POSIT ERROR	23.	130.	246.	315.
AVG RIGHT ANGLE ERROR	16.	79.	171.	247.
AVG INTENSITY MAGNITUDE ERROR	2.	4.	13.	14.
AVG INTENSITY BIAS	-2.	3.	10.	13.
NUMBER OF FORECASTS	24	23	20	15

## TROPICAL DEPRESSION 05

BEST TRACK				24 HOUR FORECAST ERRORS				48 HOUR FORECAST ERRORS				72 HOUR FORECAST ERRORS			
NO/DA/HR	POSIT	WIND	POSIT	WIND	DST	WIND	POSIT	WIND	DST	WIND	POSIT	WIND	DST	WIND	
051700Z	19.1 115.7	20	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
051700Z	18.8 115.0	20	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
051712Z	18.6 114.8	20	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
051718Z	18.2 114.2	20	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
051800Z	17.8 114.0	20	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
051800Z	17.4 113.4	20	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
051812Z	16.7 113.7	20	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
051814Z	16.2 113.4	20	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
051900Z	15.8 112.9	15	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
051900Z	15.5 112.5	15	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
051912Z	15.3 112.3	15	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
051918Z	15.1 111.0	15	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
052000Z	15.0 111.4	20	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
052000Z	15.7 112.2	20	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
052012Z	16.5 112.4	20	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
052018Z	17.6 113.2	20	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
052100Z	18.6 113.4	20	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
052100Z	19.3 114.4	20	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
052112Z	20.1 115.4	20	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
052118Z	20.4 116.4	20	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
052200Z	21.4 117.7	20	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
052200Z	21.6 119.0	20	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
052212Z	21.7 120.4	25	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
052218Z	21.8 122.3	25	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
052300Z	22.1 124.1	25	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
052300Z	22.5 126.3	30	22.5	126.2	30	0.0	25.7	134.4	25	72.0	0.0	0.0	0.0	0.0	
052312Z	22.8 128.4	30	22.8	128.4	30	13.0	25.4	137.4	25	181.0	0.0	0.0	0.0	0.0	
052318Z	23.6 130.9	30	23.3	130.7	30	21.0	26.5	139.4	25	221.0	0.0	0.0	0.0	0.0	
052400Z	24.9 132.4	25	24.4	133.0	30	14.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
052400Z	26.6 134.4	25	25.5	134.4	25	8.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
052412Z	28.2 136.2	25	28.1	136.1	25	8.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
052418Z	29.6 138.0	25	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	

ALL FORECASTS			
WMNG	24-HR	48-HR	72-HR
AVG FORECAST POSIT ERROR	12.0	15.0	0.0
AVG RIGHT ANGLE ERROR	12.0	15.0	0.0
AVG INTENSITY MAGNITUDE ERROR	1.0	0.0	0.0
AVG INTENSITY BIAS	1.0	0.0	0.0
NUMBER OF FORECASTS	4	3	0

## TYPHOON ELLIS

BEST TRACK				WARNING				24 HOUR FORECAST				48 HOUR FORECAST				72 HOUR FORECAST				
NO/DA/HR	POSIT	WIND	POSIT	WIND	DST	WIND	POSIT	WIND	DST	WIND	POSIT	WIND	DST	WIND	POSIT	WIND	DST	WIND		
062400Z	11.7 135.4	20	0.0	0.0	0.	-0.0	0.0	0.0	0.	-0.0	0.0	0.0	0.	-0.0	0.0	0.0	0.0	0.		
062406Z	12.2 135.0	20	0.0	0.0	0.	-0.0	0.0	0.0	0.	-0.0	0.0	0.0	0.	-0.0	0.0	0.0	0.0	0.		
062412Z	12.6 134.5	20	0.0	0.0	0.	-0.0	0.0	0.0	0.	-0.0	0.0	0.0	0.	-0.0	0.0	0.0	0.0	0.		
062418Z	12.9 134.2	25	0.0	0.0	0.	-0.0	0.0	0.0	0.	-0.0	0.0	0.0	0.	-0.0	0.0	0.0	0.0	0.		
063000Z	13.2 133.4	25	0.0	0.0	0.	-0.0	0.0	0.0	0.	-0.0	0.0	0.0	0.	-0.0	0.0	0.0	0.0	0.		
063006Z	13.4 133.4	30	0.0	0.0	0.	-0.0	0.0	0.0	0.	-0.0	0.0	0.0	0.	-0.0	0.0	0.0	0.0	0.		
063012Z	13.5 133.0	30	0.0	0.0	0.	-0.0	0.0	0.0	0.	-0.0	0.0	0.0	0.	-0.0	0.0	0.0	0.0	0.		
063018Z	13.6 132.4	30	0.0	0.0	0.	-0.0	0.0	0.0	0.	-0.0	0.0	0.0	0.	-0.0	0.0	0.0	0.0	0.		
070100Z	13.7 131.9	35	13.4 132.0	35	19.0	14.4 124.4	45	68.0	14.2 127.4	50	139.0	-35	14.5 125.2	60	273.0	-50	14.5 125.2	60	273.0	
070106Z	13.7 131.3	40	13.4 131.4	40	19.0	14.4 124.4	45	69.0	14.2 126.5	50	137.0	-30	14.4 124.2	60	275.0	0	14.4 124.2	60	275.0	
070112Z	13.8 130.4	40	13.4 130.9	40	23.0	15.0 124.7	50	104.0	14.2 126.4	55	198.0	-25	14.7 124.0	60	248.0	0	14.7 124.0	60	248.0	
070118Z	13.9 129.5	50	13.4 129.1	50	13.0	14.4 124.4	45	72.0	14.4 121.0	65	173.0	-5	14.8 117.8	50	107.0	-10	14.8 117.8	50	107.0	
070200Z	14.1 128.7	55	14.1 128.4	55	6.0	14.4 124.4	45	91.0	14.4 121.0	65	205.0	0	14.8 118.0	50	225.0	-5	14.8 118.0	50	225.0	
070206Z	14.4 127.4	60	14.2 127.4	55	17.0	14.0 123.4	45	110.0	14.3 120.1	65	191.0	-15	17.0 116.2	55	245.0	0	17.0 116.2	55	245.0	
070212Z	15.0 126.9	65	14.9 126.9	55	4.0	-10	16.2 122.7	65	111.0	17.0 117.9	50	149.0	-10	14.5 115.0	55	130.0	0	14.5 115.0	55	130.0
070218Z	15.5 125.9	75	15.4 125.4	65	4.0	-10	16.4 121.4	50	127.0	17.3 117.3	55	171.0	-5	14.5 113.8	60	103.0	10	14.5 113.8	60	103.0
070300Z	16.1 125.0	85	16.0 124.9	85	9.0	0	17.4 120.4	75	77.0	10.4 117.2	90	62.0	35	21.5 113.5	85	111.0	40	21.5 113.5	85	111.0
070306Z	16.8 124.2	80	16.4 124.0	90	17.0	10	18.4 120.1	80	60.0	20.4 116.4	85	67.0	30	22.3 112.8	75	140.0	50	22.3 112.8	75	140.0
070312Z	17.8 123.2	80	17.6 123.4	85	16.0	5	20.1 120.2	75	40.0	21.9 116.5	75	154.0	20	0.0	0.0	0.0	0.0	0.0		
070318Z	18.4 122.4	70	18.4 122.1	70	11.0	0	22.2 118.4	80	127.0	24.1 114.2	65	149.0	15	0.0	0.0	0.0	0.0	0.0		
070400Z	19.0 121.1	65	19.0 121.1	60	0	-5	20.4 114.4	60	21.0	21.7 112.6	50	41.0	5	0.0	0.0	0.0	0.0	0.0		
070406Z	19.5 120.2	60	19.4 120.0	60	13.0	0	20.4 114.4	55	25.0	22.1 111.7	40	49.0	15	0.0	0.0	0.0	0.0	0.0		
070412Z	19.8 119.4	60	19.7 119.0	60	23.0	0	21.4 113.7	45	31.0	0.0	0.0	0.0	0	0.0	0.0	0.0	0.0	0.0		
070418Z	20.1 117.9	60	20.1 117.9	60	0	0	21.4 113.7	40	31.0	0.0	0.0	0.0	0	0.0	0.0	0.0	0.0	0.0		
070500Z	20.2 116.1	55	20.3 116.2	60	4.0	5	21.4 111.4	40	18.0	0.0	0.0	0.0	0	0.0	0.0	0.0	0.0	0.0		
070506Z	20.3 115.2	55	20.2 114.4	60	23.0	5	21.4 109.7	40	37.0	0.0	0.0	0.0	0	0.0	0.0	0.0	0.0	0.0		
070512Z	20.5 114.1	55	20.5 114.2	60	6.0	5	0.0	0.0	0.	0.0	0.0	0.0	0	0.0	0.0	0.0	0.0	0.0		
070518Z	21.0 112.9	50	20.8 113.1	50	16.0	0	0.0	0.0	0.	0.0	0.0	0.0	0	0.0	0.0	0.0	0.0	0.0		
070600Z	21.6 111.4	45	21.1 111.4	35	26.0	-10	0.0	0.0	0.	0.0	0.0	0.0	0	0.0	0.0	0.0	0.0	0.0		
070606Z	22.0 110.1	25	21.7 110.2	25	19.0	0	0.0	0.0	0.	0.0	0.0	0.0	0	0.0	0.0	0.0	0.0	0.0		

ALL FORECASTS			
WMNG	24-HR	48-HR	72-HR
AVG FORECAST POSIT ERROR	25.0	71.0	145.0
AVG RIGHT ANGLE ERROR	21.0	57.0	103.0
AVG INTENSITY MAGNITUDE ERROR	3.0	13.0	14.0
AVG INTENSITY BIAS	-0.0	-3.0	-0.0
NUMBER OF FORECASTS	22	19	14

## TROPICAL STORM FAYE

BEST TRACK				JANUARY				24 HOUR FORECAST				48 HOUR FORECAST				72 HOUR FORECAST			
NO/DAT/HR	POSIT	WIND	PRSS	POSIT	WIND	PRSS	WIND	POSIT	WIND	PRSS	WIND	POSIT	WIND	PRSS	WIND	POSIT	WIND	PRSS	WIND
062818Z	2.8 155.0	15	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
062900Z	2.5 144.5	15	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
062906Z	2.6 153.0	15	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
062912Z	2.9 153.5	15	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
062918Z	3.2 153.7	15	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
063000Z	3.5 152.9	15	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
063006Z	3.9 152.5	20	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
063012Z	4.4 151.8	20	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
063018Z	4.9 151.2	20	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
070100Z	5.3 150.4	20	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
070106Z	5.7 150.0	25	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
070112Z	6.0 149.2	25	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
070118Z	6.2 147.9	25	6.8 149.2	25	85	5	8.8 148.4	35	148	5	10.7 142.9	35	130	15	12.2 149.2	65	177	35	35
070200Z	6.5 146.4	25	6.5 145.8	30	36	5	7.3 141.4	40	139	10	8.2 137.5	50	145	10	9.1 143.3	60	146	30	30
070206Z	7.3 145.5	25	7.0 145.1	30	30	5	7.8 141.2	40	112	5	8.4 136.8	50	140	15	9.4 142.5	60	203	35	35
070212Z	8.0 144.0	25	7.6 144.8	30	25	5	9.4 141.0	40	30	5	10.4 136.8	50	60	15	12.3 142.5	60	144	35	35
070218Z	8.6 144.1	30	8.2 143.8	30	30	0	10.4 134.8	40	59	5	11.2 135.5	50	40	20	13.0 141.5	60	142	35	35
070300Z	9.0 143.2	30	9.1 143.2	35	5	5	11.1 134.7	50	48	10	12.7 135.5	60	137	30	14.1 141.5	70	147	45	45
070306Z	9.4 142.2	35	9.4 142.1	40	25	5	12.2 134.8	60	104	20	14.4 134.2	70	211	50	16.0 140.0	80	217	55	55
070312Z	9.7 141.4	35	9.4 141.2	45	13	10	12.2 137.4	65	100	30	15.1 133.5	75	213	50	17.4 142.1	80	207	55	55
070318Z	10.0 140.8	40	10.2 139.4	50	72	10	12.1 134.7	70	160	40	15.4 130.7	75	245	50	17.7 142.3	80	240	40	40
070400Z	10.3 139.4	40	10.2 140.1	50	13	10	11.4 137.5	70	132	40	15.4 134.1	75	25	50	14.1 140.3	80	47	40	40
070406Z	10.5 139.0	35	10.8 138.8	45	21	10	13.2 134.8	65	132	40	15.7 131.0	75	142	50	0.0	0.0	0.0	0.0	0.0
070412Z	10.6 137.8	35	11.0 137.4	50	24	15	12.7 131.7	65	95	40	14.6 129.8	75	125	50	0.0	0.0	0.0	0.0	0.0
070418Z	10.4 136.8	30	10.9 136.7	55	30	25	12.4 132.2	65	141	40	14.1 127.7	75	210	55	0.0	0.0	0.0	0.0	0.0
070500Z	10.4 135.4	30	10.0 135.7	55	30	25	10.4 130.8	65	238	40	12.4 126.6	75	170	55	0.0	0.0	0.0	0.0	0.0
070506Z	11.1 135.5	25	10.2 134.4	50	75	25	10.0 130.4	55	226	30	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
070512Z	11.9 135.1	25	11.1 135.1	35	49	10	11.4 137.4	25	250	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
070518Z	12.6 134.4	25	11.5 135.0	35	70	10	12.4 137.4	25	235	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
070600Z	13.3 133.8	25	13.2 133.8	25	5	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
070606Z	13.8 133.0	25	13.0 132.7	25	19	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
070612Z	15.2 131.0	25	14.5 131.1	25	42	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
070618Z	16.1 130.7	20	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
070700Z	17.0 129.8	20	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

## ALL FORECASTS

	24-HR	48-HR	72-HR
AVG FORECAST POSIT ERROR	35	138	167
AVG RIGHT ANGLE ERROR	21	86	91
AVG INTENSITY MAGNITUDE ERROR	9	21	37
AVG INTENSITY BIAS	9	21	37
NUMBER OF FORECASTS	20	17	14

## TROPICAL DEPRESSION 08

BEST TRACK				JANUARY				24 HOUR FORECAST				48 HOUR FORECAST				72 HOUR FORECAST			
NO/DAT/HR	POSIT	WIND	PRSS	POSIT	WIND	PRSS	WIND	POSIT	WIND	PRSS	WIND	POSIT	WIND	PRSS	WIND	POSIT	WIND	PRSS	WIND
072306Z	19.5 140.8	20	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
072312Z	20.3 139.0	20	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
072318Z	21.2 137.5	20	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
072400Z	22.0 135.8	20	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
072406Z	22.7 134.4	20	24.3 133.8	20	105	0	28.0 124.2	20	183	0	20.0 119.0	15	196	-5	0.0	0.0	0.0	0.0	0.0
072412Z	23.4 133.0	20	23.3 133.0	20	5	0	25.8 127.2	20	96	5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
072418Z	24.0 131.5	20	23.9 131.8	20	17	0	26.0 127.0	20	203	5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
072500Z	25.0 130.2	20	24.4 130.4	20	42	0	26.4 124.4	15	249	-5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
072506Z	26.0 128.8	20	25.4 129.5	20	45	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
072512Z	27.4 127.4	15	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
072518Z	29.4 127.0	15	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
072600Z	31.5 126.3	20	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
072606Z	33.3 124.9	20	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

## ALL FORECASTS

	24-HR	48-HR	72-HR
AVG FORECAST POSIT ERROR	43	105	395
AVG RIGHT ANGLE ERROR	20	70	195
AVG INTENSITY MAGNITUDE ERROR	0	4	5
AVG INTENSITY BIAS	0	1	-5
NUMBER OF FORECASTS	5	6	1

## SUPER TYPHOON HOPE

HFST TRACK				VARYING				2d MONTH FORECAST				6d MONTH FORECAST				12 MONTH FORECAST			
				ERRORS				ENHJMS				ENHJMS							
MO/YR/HST	POSST	WIND		POSST	WIND	DST WIND		POSST	WIND	DST WIND		POSST	WIND	DST WIND		POSST	WIND	DST WIND	
0724067	10.22	147.4	20	0.0	0.0	0	-0.0	0.0	0.0	0	-0.0	0.0	0.0	0	-0.0	0.0	0.0	0	
0724121	10.3	146.3	20	0.0	0.0	0	-0.0	0.0	0.0	0	-0.0	0.0	0.0	0	-0.0	0.0	0.0	0	
0724182	10.3	146.2	20	0.0	0.0	0	-0.0	0.0	0.0	0	-0.0	0.0	0.0	0	-0.0	0.0	0.0	0	
0725007	10.4	145.4	20	0.0	0.0	0	-0.0	0.0	0.0	0	-0.0	0.0	0.0	0	-0.0	0.0	0.0	0	
0725062	10.7	144.4	20	0.0	0.0	0	-0.0	0.0	0.0	0	-0.0	0.0	0.0	0	-0.0	0.0	0.0	0	
0725127	10.9	144.0	25	11.0	144.1	25	4.0	12.4	140.4	30	42	14.4	137.0	35	147	15	14.1	133.2	
0725187	11.1	143.3	25	11.1	143.0	25	14.0	12.3	134.4	30	50	14	134.0	35	146	10	14.0	130.3	
0726002	11.2	142.4	20	11.1	142.7	20	19.0	12.2	134.4	30	92	14.4	134.8	35	149	5	14.9	130.4	
0726062	11.5	141.4	20	11.4	141.4	20	19.0	12.7	137.4	30	111	14	137.4	35	148	0	14.7	138.2	
0726127	11.8	140.7	20	11.8	140.4	20	19.0	13.1	137.0	30	194	14	137.2	35	140	0	14.2	137.0	
0726182	12.3	139.4	15	12.0	139.7	20	13.0	13.4	136.7	30	199	14	136.1	35	135	0	14.7	137.0	
0727002	12.4	140.3	15	12.7	139.7	20	44.0	14.4	135.4	25	172	-4	131.4	30	150	-10	17.8	127.3	
0727062	14.2	140.3	14	13.7	140.7	20	34.0	0.0	0.0	0	-0.0	0.0	0.0	0	-0.0	0.0	0.0	0	
0727121	15.0	139.4	20	0.0	0.0	0	-0.0	0.0	0.0	0	-0.0	0.0	0.0	0	-0.0	0.0	0.0	0	
0727182	15.4	138.4	25	0.0	0.0	0	-0.0	0.0	0.0	0	-0.0	0.0	0.0	0	-0.0	0.0	0.0	0	
0728002	16.1	137.4	30	16.7	137.4	25	6	-5	18.4	137.4	40	160	0	18.7	129.4	50	140	-25	
0728062	16.8	137.4	35	17.5	138.4	25	85	-10	20.7	134.4	40	259	0	23.1	133.1	50	143	-30	
0729122	17.2	136.0	35	19.2	137.2	25	62	-10	21.4	134.0	35	303	0	24.0	131.3	45	145	-40	
0729187	17.1	136.2	35	19.0	136.4	25	114	-10	22.2	134.4	35	331	0	24.4	129.8	40	147	-45	
0729002	17.7	135.7	40	18.4	135.2	35	29	-5	17.4	132.7	30	85	0	18.5	128.6	40	145	-40	
0729062	18.6	135.4	40	18.2	135.1	40	29	-10	16.7	131.4	30	58	0	18.1	128.1	40	146	-40	
0729122	18.6	134.4	40	18.1	134.0	40	65	0	17.1	132.4	35	39	0	18.1	129.3	40	145	-40	
0729182	18.7	134.2	40	16.4	134.4	35	14	0	17.1	131.4	40	40	0	18.7	128.7	40	146	-40	
0730002	18.6	133.4	45	16.3	133.4	35	8	0	18.0	130.7	40	30	0	19.7	126.9	100	114	-30	
0730067	17.1	132.7	40	17.1	132.4	40	4	0	18.2	129.4	40	121	0	19.4	126.3	100	119	-25	
0730122	17.4	131.4	45	17.2	132.0	40	17	5	18.1	129.1	110	197	0	20.4	125.8	120	134	0	
0730182	18.0	130.4	40	17.5	131.1	45	41	5	19.0	128.0	110	197	0	20.7	124.9	120	134	5	
0731007	18.6	129.4	100	19.5	129.3	100	4	0	20.5	124.0	110	40	0	22.0	120.0	100	100	-5	
0731062	19.3	127.4	115	19.2	128.0	105	13	-10	21.7	123.7	110	104	0	22.4	117.9	80	122	-5	
0731127	19.6	126.2	130	19.7	126.4	130	11	0	21.4	122.1	120	0	0	24.0	115.7	35	131	-35	
0731182	20.1	124.7	130	20.1	124.4	130	5	0	22.0	114.4	120	29	0	24.6	115.2	25	133	-25	
0800002	20.6	123.7	110	20.7	123.2	110	6	0	22.4	117.7	40	50	0	0	0	0	0	0	
0800062	20.8	121.4	110	20.8	121.4	105	6	0	22.7	114.4	75	116	0	0	0	0	0	0	
0800112	21.3	120.7	120	21.4	121.2	120	6	0	21.4	114.4	75	150	0	0	0	0	0	0	
0800182	21.7	118.2	115	21.3	118.1	109	15	0	21.4	113.4	25	225	0	0	0	0	0	0	
0800207	22.2	116.4	105	22.0	116.4	105	13	0	22.4	114.4	45	183	0	0	0	0	0	0	
0802067	22.5	113.0	45	22.6	114.0	40	4	5	23.1	104.4	30	103	0	0	0	0	0	0	
0802122	22.7	111.7	70	22.6	112.7	70	21	0	0	0	0	-0.0	0.0	0	0	0	0	0	
0802182	22.6	109.4	40	22.7	110.1	60	24	10	0	0	0	0	0	0	0	0	0	0	
0803002	22.2	107.4	35	22.5	108.0	35	33	0	0	0	0	-0.0	0.0	0	0	0	0	0	
0803067	21.7	115.4	30	0.0	0.0	0	-0.0	0.0	0.0	0	-0.0	0.0	0.0	0	-0.0	0.0	0	0	
0803127	21.1	103.1	20	0.0	0.0	0	-0.0	0.0	0.0	0	-0.0	0.0	0.0	0	-0.0	0.0	0	0	
0803182	20.6	101.7	20	0.0	0.0	0	-0.0	0.0	0.0	0	-0.0	0.0	0.0	0	-0.0	0.0	0	0	
0804002	20.7	100.4	20	0.0	0.0	0	-0.0	0.0	0.0	0	-0.0	0.0	0.0	0	-0.0	0.0	0	0	
0804062	20.7	98.2	20	0.0	0.0	0	-0.0	0.0	0.0	0	-0.0	0.0	0.0	0	-0.0	0.0	0	0	
0804122	20.7	97.0	20	0.0	0.0	0	-0.0	0.0	0.0	0	-0.0	0.0	0.0	0	-0.0	0.0	0	0	
0804182	20.9	96.7	10	0.0	0.0	0	-0.0	0.0	0.0	0	-0.0	0.0	0.0	0	-0.0	0.0	0	0	
0805002	21.2	95.4	10	0.0	0.0	0	-0.0	0.0	0.0	0	-0.0	0.0	0.0	0	-0.0	0.0	0	0	
0805062	21.5	94.5	15	0.0	0.0	0	-0.0	0.0	0.0	0	-0.0	0.0	0.0	0	-0.0	0.0	0	0	
0805127	21.7	93.4	15	0.0	0.0	0	-0.0	0.0	0.0	0	-0.0	0.0	0.0	0	-0.0	0.0	0	0	
0805182	22.2	92.7	20	0.0	0.0	0	-0.0	0.0	0.0	0	-0.0	0.0	0.0	0	-0.0	0.0	0	0	
0806002	22.3	92.0	20	0.0	0.0	0	-0.0	0.0	0.0	0	-0.0	0.0	0.0	0	-0.0	0.0	0	0	
0806062	22.3	91.4	25	0.0	0.0	0	-0.0	0.0	0.0	0	-0.0	0.0	0.0	0	-0.0	0.0	0	0	
0806122	22.2	90.2	25	0.0	0.0	0	-0.0	0.0	0.0	0	-0.0	0.0	0.0	0	-0.0	0.0	0	0	
0806182	21.8	90.1	24	0.0	0.0	0	-0.0	0.0	0.0	0	-0.0	0.0	0.0	0	-0.0	0.0	0	0	
0807002	21.7	89.7	25	0.0	0.0	0	-0.0	0.0	0.0	0	-0.0	0.0	0.0	0	-0.0	0.0	0	0	
0807062	21.7	88.4	25	0.0	0.0	0	-0.0	0.0	0.0	0	-0.0	0.0	0.0	0	-0.0	0.0	0	0	
0807127	21.8	88.1	25	0.0	0.0	0	-0.0	0.0	0.0	0	-0.0	0.0	0.0	0	-0.0	0.0	0	0	
0807182	22.2	87.2	30	0.0	0.0	0	-0.0	0.0	0.0	0	-0.0	0.0	0.0	0	-0.0	0.0	0	0	
0808002	22.4	86.4	25	0.0	0.0	0	-0.0	0.0	0.0	0	-0.0	0.0	0.0	0	-0.0	0.0	0	0	
0809062	22.5	85.4	25	0.0	0.0	0	-0.0	0.0	0.0	0	-0.0	0.0	0.0	0	-0.0	0.0	0	0	
0809122	22.5	84.4	20	0.0	0.0	0	-0.0	0.0	0.0	0	-0.0	0.0	0.0	0	-0.0	0.0	0	0	

## AIR FORECASTS

	WING	26-48	68-84	72-100
AVG FORECAST POSIT ERRON	23.	130.	265.	370.
AVG RIGHT ANGLE ERRON	16.	75.	140.	100.
AVG INTENSITY MAGNITUDE ERROR	3.	10.	22.	10.
AVG INTENSITY BIAS	-1.	-9.	-14.	-14.
NUMBER OF FORECASTS	33	22	23	21

## TROPICAL STORM GORDON

BEST TRACK				WAKING				24 HOUR FORECAST				48 HOUR FORECAST				72 HOUR FORECAST			
NO/04/07	POSIT	WIND	DIR	POSIT	WIND	DIR	POSIT	WIND	DIR	POSIT	WIND	DIR	POSIT	WIND	DIR	POSIT	WIND	DIR	
072012Z	18.8 112.7	15	0.0	0.0	0	-0.0	0.0	0.0	0	-0.0	0.0	0.0	0.0	0.0	0	0.0	0.0	0	
072018Z	19.0 111.5	20	0.0	0.0	0	-0.0	0.0	0.0	0	-0.0	0.0	0.0	0.0	0.0	0	0.0	0.0	0	
072000Z	19.3 110.4	25	0.0	0.0	0	-0.0	0.0	0.0	0	-0.0	0.0	0.0	0.0	0.0	0	0.0	0.0	0	
072006Z	19.9 109.7	30	0.0	0.0	0	-0.0	0.0	0.0	0	-0.0	0.0	0.0	0.0	0.0	0	0.0	0.0	0	
072012Z	20.2 108.7	35	20.2	129.5	30	45	-5	21.8	127.7	45	20.8	-4	24.0	125.2	50	30.5	-5	24.8	
072018Z	20.6 107.5	40	20.5	124.8	30	85	-10	22.5	124.8	45	24.4	-1	24.7	124.3	50	32.8	0	24.0	
072000Z	20.5 106.2	40	20.6	126.2	35	6	-5	21.4	121.4	45	43	015	24.0	118.5	50	43	0	24.0	
072006Z	20.6 105.1	45	20.7	125.4	40	8	-5	21.7	121.4	50	50	010	23.4	117.8	50	100	5	24.0	
072012Z	20.8 104.2	50	20.7	124.2	40	6	-10	21.2	119.2	50	64	-4	22.4	115.8	50	48	30	24.0	
072018Z	20.8 102.8	55	20.9	123.1	45	17	-10	21.4	118.1	55	70	5	24.0	0.0	0	0	0	24.0	
072000Z	20.9 101.7	60	20.4	121.5	50	13	-10	20.0	116.2	65	120	15	24.0	0.0	0	0	0	24.0	
072006Z	21.3 100.8	60	20.3	120.5	55	23	-5	20.9	115.4	70	130	25	24.0	0.0	0	0	0	24.0	
072012Z	22.0 100.1	65	22.0	120.2	55	6	0	24.4	114.2	75	211	5	24.0	0.0	0	0	0	24.0	
072018Z	22.5 118.4	60	22.9	119.3	55	33	5	0.0	0.0	0	-0.0	0.0	0.0	0.0	0	0.0	0.0	0	
072000Z	22.7 117.4	50	22.4	117.3	50	8	0	0.0	0.0	0	-0.0	0.0	0.0	0.0	0	0.0	0.0	0	
072006Z	23.1 116.0	45	23.1	116.2	45	11	0	0.0	0.0	0	-0.0	0.0	0.0	0.0	0	0.0	0.0	0	
072012Z	23.1 114.7	20	23.3	115.2	30	30	10	0.0	0.0	0	-0.0	0.0	0.0	0.0	0	0.0	0.0	0	

ALL FORECASTS				
WAKING	24-HR	48-HR	72-HR	
AVG FORECAST POSIT ERROR	23.	179.	173.	449.
AVG RIGHT ANGLE ERROR	12.	90.	121.	274.
AVG INTENSITY MAGNITUDE ERROR	6.	11.	4.	40.
AVG INTENSITY HTAS	-3.	1.	4.	40.
NUMBER OF FORECASTS	17	3	5	1

## TROPICAL DEPRESSION 11

BEST TRACK			WAVING			24 HOUR FORECAST			48 HOUR FORECAST			72 HOUR FORECAST		
NO/JA/MD	POSIT	WIND	POSIT	WIND	POSIT	WIND	POSIT	WIND	POSIT	WIND	POSIT	WIND	POSIT	WIND
000206	11.7 135.3	15	0.0 0.0	0	-0.0 0.0	0	-0.0 0.0	0	-0.0 0.0	0	-0.0 0.0	0	-0.0 0.0	0
000212	12.3 136.0	15	0.0 0.0	0	-0.0 0.0	0	-0.0 0.0	0	-0.0 0.0	0	-0.0 0.0	0	-0.0 0.0	0
000218	12.8 136.0	15	0.0 0.0	0	-0.0 0.0	0	-0.0 0.0	0	-0.0 0.0	0	-0.0 0.0	0	-0.0 0.0	0
000307	13.8 133.1	15	0.0 0.0	0	-0.0 0.0	0	-0.0 0.0	0	-0.0 0.0	0	-0.0 0.0	0	-0.0 0.0	0
000307	13.9 132.1	15	14.0 131.7	15	24 0.0	15.4 124.0	25 60 5	17.9 123.7	35 144 10	20.4 118.6	50 145 15			
000312	14.2 131.3	15	14.4 130.7	20 37 2	16.2 127.0	30 87 10	18.4 122.7	35 144 10	20.9 117.5	50 146 15				
000318	14.5 130.4	20	14.3 129.8	20 47 0	16.7 126.2	35 103 15	18.4 122.5	40 180 25	20 0 0	0 0 0				
000407	14.9 129.4	20	14.9 129.7	20 6 0	16.8 126.0	30 90 10	18.7 122.0	40 74 20	20 0 0	0 0 0				
000407	15.3 129.1	20	15.7 128.5	20 42 0	18.5 122.4	30 221 5	20.1 118.4	40 107 25	20 0 0	0 0 0				
000412	16.0 128.4	20	16.0 128.4	20 121 0	18.0 122.2	25 193 5	20.2 118.0	35 137 20	20 0 0	0 0 0				
000418	16.1 128.0	20	16.7 125.4	20 143 0	19.0 121.1	25 158 5	20 0 0	0 0 0	20 0 0	0 0 0				
000507	17.7 127.6	20	17.4 127.4	25 5 5	20.4 124.2	30 94 10	20 0 0	0 0 0	20 0 0	0 0 0				
000507	14.6 126.5	24	18.5 128.2	25 95 0	22.0 124.4	30 285 15	20 0 0	0 0 0	20 0 0	0 0 0				
000512	19.1 125.4	25	19.5 125.4	25 30 0	23.0 121.1	30 132 15	20 0 0	0 0 0	20 0 0	0 0 0				
000518	19.2 124.1	20	19.5 124.4	25 29 5	0 0 0	0 0 0	20 0 0	0 0 0	20 0 0	0 0 0				
000607	19.5 123.0	20	19.7 123.1	25 13 5	0 0 0	0 0 0	20 0 0	0 0 0	20 0 0	0 0 0				
000607	20.6 121.9	15	20.0 122.2	20 40 5	0 0 0	0 0 0	20 0 0	0 0 0	20 0 0	0 0 0				
000612	21.0 120.3	15	20.9 120.5	20 13 5	0 0 0	0 0 0	20 0 0	0 0 0	20 0 0	0 0 0				

## ALL FORECASTS

	WIND	24-HR	48-HR	72-HR
AVG FORECAST POSIT ERROR	47	144	134	171
AVG RIGHT ANGLE ERROR	70	96	83	124
AVG INTENSITY MAGNITUDE ERROR	7	9	14	16
AVG INTENSITY RMS	7	9	14	16
NUMBER OF FORECASTS	14	10	6	3

## TYPHOON IRVING

BEST TRACK				WAVING				24 HOUR FORECAST				48 HOUR FORECAST				72 HOUR FORECAST			
NO/JA/MD	POSIT	WIND		POSIT	WIND	DIRT WIND		POSIT	WIND	DIRT WIND		POSIT	WIND	DIRT WIND		POSIT	WIND	DIRT WIND	
000712	14.0 137.7	20	0.0 0.0	0	-0.0	0	0.0 0.0	0	-0.0	0	0.0 0.0	0	-0.0	0	0.0 0.0	0	-0.0	0	
000718	15.0 138.0	20	0.0 0.0	0	-0.0	0	0.0 0.0	0	-0.0	0	0.0 0.0	0	-0.0	0	0.0 0.0	0	-0.0	0	
000802	15.6 138.1	25	0.0 0.0	0	-0.0	0	0.0 0.0	0	-0.0	0	0.0 0.0	0	-0.0	0	0.0 0.0	0	-0.0	0	
000807	16.4 138.0	25	0.0 0.0	0	-0.0	0	0.0 0.0	0	-0.0	0	0.0 0.0	0	-0.0	0	0.0 0.0	0	-0.0	0	
000812	16.8 137.4	25	0.0 0.0	0	-0.0	0	0.0 0.0	0	-0.0	0	0.0 0.0	0	-0.0	0	0.0 0.0	0	-0.0	0	
000818	17.4 136.4	25	0.0 0.0	0	-0.0	0	0.0 0.0	0	-0.0	0	0.0 0.0	0	-0.0	0	0.0 0.0	0	-0.0	0	
000902	17.7 136.0	30	17.4 136.0	30	6	0	19.9 132.4	35	103	5	21.0 129.2	45	229	15	21.5 126.0	55	210	5	
000907	18.0 135.4	30	18.3 135.1	30	29	0	21.0 130.1	40	188	10	21.7 126.5	50	344	15	22.0 118.5	60	420	5	
000912	18.2 134.8	30	18.1 135.2	30	23	0	19.7 131.1	40	150	10	21.4 129.5	50	244	10	21.8 123.5	60	266	5	
000918	18.3 134.2	30	18.0 135.0	30	49	0	19.4 134.4	40	287	10	21.7 130.8	55	245	10	22.3 125.0	60	211	0	
001002	18.4 133.3	30	18.5 133.5	25	13	-5	19.4 130.4	35	183	5	20.4 126.8	40	142	-10	21.0 122.5	45	242	-20	
001007	18.4 132.2	30	18.4 132.7	25	37	-5	20.1 129.4	35	224	0	21.2 126.0	40	179	-15	22.2 121.3	45	301	-25	
001012	18.3 131.1	30	18.7 131.4	30	29	0	19.4 127.1	40	198	0	21.1 123.4	45	243	-10	21.8 119.8	50	309	-20	
001018	18.0 129.7	30	18.7 130.1	30	44	0	19.4 124.7	40	198	-5	21.0 121.4	45	321	-15	21.0 116.9	50	442	-20	
001102	17.2 128.4	30	17.3 128.7	30	8	0	17.1 124.4	45	187	-5	18.4 120.4	40	365	-25	19.8 115.5	50	572	-25	
001107	16.5 128.5	35	17.0 127.8	30	50	-5	17.2 121.7	45	208	0	19.0 119.4	40	423	-30	20.2 114.5	50	613	-25	
001112	16.9 129.0	40	17.2 129.2	35	21	-5	18.1 125.4	45	80	0	18.2 121.2	50	341	-20	19.7 116.7	55	521	-25	
001118	17.5 128.4	45	17.9 128.4	40	31	-5	19.4 124.0	50	108	0	19.0 120.8	55	310	-15	19.7 116.7	65	517	-20	
001207	17.8 127.4	50	17.5 128.2	55	39	5	18.7 124.5	65	104	0	19.1 121.7	70	321	-5	19.5 117.5	70	415	-20	
001208	18.4 127.1	54	17.4 127.4	55	38	0	19.4 124.4	65	168	-5	19.1 120.9	70	344	-5	19.8 116.7	70	447	-20	
001212	18.7 126.0	54	18.5 126.4	55	26	0	19.4 121.4	65	213	-5	19.4 119.6	70	403	-10	19.9 115.5	75	483	-15	
001218	19.2 126.4	60	18.8 125.4	55	61	-5	19.4 122.4	65	226	-5	20.0 118.8	75	419	-10	19.2 115.5	80	713	-10	
001307	20.0 126.7	65	20.1 126.8	65	8	0	23.4 124.0	75	58	0	27.4 127.5	80	103	-10	29.9 121.0	80	379	-10	
001308	21.1 126.4	70	21.1 126.8	70	11	0	25.0 120.4	75	236	0	28.4 128.5	80	249	-10	30.5 132.9	80	473	-10	
001312	22.0 126.0	70	22.0 126.4	70	33	0	25.0 127.0	75	156	-5	20.4 129.0	80	303	-10	31.7 132.9	80	447	-5	
001318	22.7 125.2	70	23.2 125.7	70	41	0	27.4 125.7	80	203	-5	31.0 131.2	85	416	-5	32.6 137.0	85	443	5	
001407	23.5 125.0	75	23.7 125.1	70	13	-5	27.4 124.4	85	128	-10	31.4 127.2	80	223	-10	34.0 130.6	70	242	0	
001408	24.0 124.8	75	24.1 124.0	75	4	0	27.4 124.2	85	60	-5	31.7 126.8	80	143	-10	34.5 136.0	70	174	15	
001412	24.6 124.4	80	24.6 124.4	80	16	0	30.8 124.7	100	252	10	30.4 126.7	110	142	25	34.4 139.8	85	167	25	
001418	25.2 124.4	85	25.3 124.4	85	4	0	28.2 124.4	105	51	15	31.5 126.2	110	136	30	34.7 149.5	80	301	35	
001507	25.9 124.7	90	25.7 124.4	90	13	0	28.4 124.0	100	60	10	31.4 124.7	100	144	30	34.6 127.5	80	424	55	
001508	26.9 124.1	90	26.5 124.4	90	29	0	29.3 124.2	95	82	5	32.4 125.1	90	201	35	34.2 128.3	75	426	50	
001512	27.5 123.7	90	27.5 123.0	90	11	0	30.4 121.4	95	72	10	34.4 125.1	90	270	60	34	0	0	0	
001518	28.5 123.7	90	28.3 123.0	90	13	0	31.4 121.4	95	78	15	34.7 126.0	90	345	35	34	0	0	0	
001602	29.6 123.7	90	29.5 123.7	95	6	5	33.4 124.4	85	39	15	37.3 127.7	60	347	35	34	0	0	0	
001608	30.6 123.7	90	31.1 123.4	90	30	0	36.4 124.4	80	64	25	40.4 131.5	45	242	20	34	0	0	0	
001612	31.7 123.7	95	31.6 123.7	90	6	5	36.1 124.4	80	219	50	34	0	0	0	34	0	0	0	
001618	32.8 124.0	90	32.4 123.4	80	10	0	37.3 124.4	75	285	50	34	0	0	0	34	0	0	0	
001702	34.0 125.0	70	34.1 124.0	70	8	0	38.7 124.8	50	291	24	34	0	0	0	34	0	0	0	
001708	35.6 126.7	55	35.2 126.2	60	34	5	39.1 130.0	35	364	10	34	0	0	0	34	0	0	0	
001712	37.1 128.0	30	36.6 128.4	30	33	0	0	0	0	0	34	0	0	0	34	0	0	0	
001718	39.5 131.4	25	38.9 131.4	30	36	5	0	0	0	0	34	0	0	0	34	0	0	0	
001802	42.0 133.4	25	42.1 134.1	25	36	0	0	0	0	0	34	0	0	0	34	0	0	0	
001808	44.2 135.3	25	44.9 137.0	25	81	0	0	0	0	0	34	0	0	0	34	0	0	0	

## ALL FORECASTS

	WIND	24-HR	48-HR	72-HR
AVG FORECAST POSIT ERROR	26	163	285	461
AVG RIGHT ANGLE ERROR	17	98	209	340
AVG INTENSITY MAGNITUDE ERROR	7	11	15	28
AVG INTENSITY RMS	7	9	14	28
NUMBER OF FORECASTS	34	34	30	25

SUPER TYPHOON JUDY

BEST TRACK				DAMAGING				24 HOUR FORECAST				48 HOUR FORECAST				72 HOUR FORECAST			
NO/DA/HR	POSIT	WIND		POSIT	WIND	OST WIND		POSIT	WIND	OST WIND		POSIT	WIND	OST WIND		POSIT	WIND	OST WIND	
081512Z	10.5 151.0	14		0.0 0.0	0	-0.0 0.0		0.0 0.0	0	-0.0 0.0		0.0 0.0	0	-0.0 0.0		0.0 0.0	0	-0.0 0.0	
081518Z	11.3 150.1	14		0.0 0.0	0	-0.0 0.0		0.0 0.0	0	-0.0 0.0		0.0 0.0	0	-0.0 0.0		0.0 0.0	0	-0.0 0.0	
081600Z	11.8 149.0	14		0.0 0.0	0	-0.0 0.0		0.0 0.0	0	-0.0 0.0		0.0 0.0	0	-0.0 0.0		0.0 0.0	0	-0.0 0.0	
081606Z	12.3 147.4	15		0.0 0.0	0	-0.0 0.0		0.0 0.0	0	-0.0 0.0		0.0 0.0	0	-0.0 0.0		0.0 0.0	0	-0.0 0.0	
081612Z	12.8 146.1	24		0.0 0.0	0	-0.0 0.0		0.0 0.0	0	-0.0 0.0		0.0 0.0	0	-0.0 0.0		0.0 0.0	0	-0.0 0.0	
081618Z	13.3 144.7	30		13.6 144.4	35	21.5		16.4 144.3	40	18.9		20.4 136.8	70	192.20		26.1 132.9	85	210.2	
081700Z	13.8 143.4	34		13.9 142.2	40	13.45		16.4 134.3	60	62.4		14.1 134.5	70	63.4		27.9 131.4	85	144.2	
081706Z	14.2 142.2	34		14.2 142.0	40	12.5		16.7 137.4	60	52.4		14.1 133.0	70	121.4		27.9 131.4	85	144.2	
081712Z	14.5 141.1	40		14.6 140.4	45	30.5		16.7 134.4	65	111.4		14.0 130.0	70	221.4		21.1 127.0	85	125.2	
081718Z	15.0 140.0	50		15.0 139.4	50	35.0		17.1 134.4	65	112.4		10.3 130.0	70	247.4		21.9 126.4	85	112.2	
081800Z	15.7 139.0	44		15.4 138.0	55	19.0		17.3 134.3	75	101.4		10.3 130.1	80	249.4		21.6 126.7	90	246.0	
081806Z	16.4 138.2	74		16.0 137.4	60	42.15	-15	18.1 133.1	75	120.4		20.0 124.0	85	248.4	-50	22.5 125.7	90	247.0	
081812Z	17.1 137.3	40		16.8 137.3	70	18.10	-10	18.7 133.4	85	93.4		20.2 124.1	90	245.4	-45	22.9 125.8	95	224.4	-45
081818Z	17.6 136.4	40		17.4 136.4	75	12.15	-15	19.4 132.4	85	121.4		21.1 124.2	90	247.4	-35	24.0 125.3	95	108.4	-45
081900Z	18.2 135.4	110		18.2 135.7	110	6.0	0	20.4 131.3	130	99.4		22.4 124.5	135	106.15	15	24.3 124.5	135	40.4	40
081906Z	19.0 135.1	114		18.9 135.0	115	8.0	0	21.3 131.5	130	109.4	-45	23.4 124.0	135	47.25	25	24.2 124.0	135	131.4	45
081912Z	19.7 134.7	120		19.7 134.4	125	11.5	5	22.3 131.2	135	81.4	0	24.0 124.5	135	42.35	35	27.7 124.7	125	240.3	35
081918Z	20.5 134.4	124		20.2 134.2	130	21.5	5	22.3 132.1	135	54.4	10	24.4 130.5	135	48.35	35	27.3 124.3	125	241.4	40
082000Z	21.3 133.4	130		21.3 133.4	135	0.5	5	24.4 132.2	135	89.15	15	27.3 133.2	135	379.4	40	24.6 127.1	115	240.4	40
082006Z	22.2 133.2	134		22.2 133.2	135	0.5	0	25.4 131.5	135	97.24	24	28.3 133.0	135	375.4	45	30.6 127.2	115	240.4	30
082012Z	22.7 132.4	134		23.1 132.4	135	26.0	0	26.4 130.7	120	139.20	20	29.0 130.6	110	340.20	20	31.8 126.5	95	416.10	10
082018Z	23.1 131.0	124		23.3 131.2	130	40.5	5	25.1 124.8	115	121.14	10	27.4 125.3	105	170.20	20	31.3 126.5	90	242.7	10
082100Z	23.4 131.1	120		23.4 131.0	120	5.0	5	24.4 124.0	110	6.14	14	24.2 125.7	100	24.15	15	30.0 125.8	85	170.4	4
082106Z	24.2 130.4	110		24.0 130.4	115	18.5	5	24.4 124.0	105	160.14	15	24.2 127.7	90	176.5	5	32.5 127.5	85	116.14	5
082112Z	24.3 129.4	100		24.5 129.4	115	12.15	15	26.4 127.0	100	129.14	10	24.7 125.7	90	127.5	5	31.2 126.1	80	109.20	10
082118Z	24.4 128.0	100		24.7 128.7	115	21.15	15	27.0 124.7	100	118.14	15	20.2 124.5	90	91.10	10	31.6 125.1	75	142.20	10
082200Z	24.4 127.4	94		24.4 127.4	90	11.5	-5	25.0 124.4	95	45.4	22	27.7 122.1	80	71.30	-30	29.9 121.9	75	175.30	-30
082206Z	24.4 127.4	90		24.4 127.2	85	16.5	-5	25.4 124.4	90	70.4	22	27.7 121.0	80	104.20	-20	30.1 119.7	25	215.25	-25
082212Z	24.5 127.0	90		24.3 126.8	85	16.5	-5	25.4 124.1	90	151.4	22	27.0 121.5	80	177.10	-10	30.0 119.7	25	215.25	-10
082218Z	25.1 126.3	84		24.4 126.1	80	21.5	-5	26.4 123.3	85	84.4	22	20.2 121.0	80	114.25	-10	30.0 119.7	25	215.25	-10
082300Z	25.8 125.4	84		25.8 125.7	85	5.0	0	27.0 123.1	70	49.4	11	20.2 120.0	80	135.15	-10	30.0 119.7	25	215.25	-10
082306Z	26.9 124.4	84		26.7 124.4	80	20.5	-5	29.2 121.5	50	58.4	20	31.7 119.4	25	215.25	-25	30.0 119.7	25	215.25	-25
082312Z	27.5 123.7	84		27.5 123.7	80	0.5	-5	30.1 120.7	45	100.4	10	30.0 119.4	20	0.0	-10	30.0 119.7	25	215.25	-10
082318Z	28.2 123.2	80		28.0 123.0	80	16.0	0	30.4 120.1	40	134.4	10	30.0 119.4	20	0.0	-10	30.0 119.7	25	215.25	-10
082400Z	28.7 122.0	80		28.4 122.7	70	12.10	-10	31.2 120.3	30	144.4	20	30.0 119.4	20	0.0	-10	30.0 119.7	25	215.25	-10
082406Z	29.3 122.4	70		29.5 122.2	65	24.5	-5	32.2 120.2	30	181.4	20	30.0 119.4	20	0.0	-10	30.0 119.7	25	215.25	-10
082412Z	29.8 122.4	60		29.9 122.2	55	17.5	-5	32.4 120.4	30	187.4	10	30.0 119.4	20	0.0	-10	30.0 119.7	25	215.25	-10
082418Z	30.4 122.7	54		30.6 122.2	55	24.0	0	32.4 120.2	25	247.4	-45	30.0 119.4	20	0.0	-10	30.0 119.7	25	215.25	-10
082500Z	30.9 123.1	54		30.9 122.7	50	21.5	-5	32.4 120.2	25	147.4	0	30.0 119.4	20	0.0	-10	30.0 119.7	25	215.25	-10
082506Z	31.4 123.4	50		31.4 123.4	45	5.5	-5	34.1 124.3	25	41.4	0	30.0 119.4	20	0.0	-10	30.0 119.7	25	215.25	-10
082512Z	31.8 124.2	40		32.0 124.1	40	13.0	0	34.7 127.2	25	66.4	0	30.0 119.4	20	0.0	-10	30.0 119.7	25	215.25	-10
082518Z	32.5 125.1	30		32.3 125.3	35	15.5	5	34.0 127.0	20	40.4	0	30.0 119.4	20	0.0	-10	30.0 119.7	25	215.25	-10
082600Z	33.2 126.1	24		33.6 126.7	30	39.5	5	34.0 127.0	20	40.4	0	30.0 119.4	20	0.0	-10	30.0 119.7	25	215.25	-10
082606Z	33.9 127.1	24		34.4 127.4	25	39.5	0	34.0 127.0	20	40.4	0	30.0 119.4	20	0.0	-10	30.0 119.7	25	215.25	-10
082612Z	34.4 128.4	20		34.4 128.4	20	-0.0 0.0	0	34.0 127.0	20	40.4	0	30.0 119.4	20	0.0	-10	30.0 119.7	25	215.25	-10

AIR FORECASTS

	WIND	24-HR	48-HR	72-HR
AVG FORECAST POSIT ERROR	19.	105.	173.	277.
AVG RIGHT ANGLE ERROR	12.	81.	139.	217.
AVG INTENSITY MAGNITUDE ERROR	6.	16.	23.	24.
AVG INTENSITY RTAS	1.	-7.	-3.	-1.
NUMBER OF FORECASTS	30	36	27	23

TROPICAL DEPRESSION 14

BEST TRACK				DAMAGING				24 HOUR FORECAST				48 HOUR FORECAST				72 HOUR FORECAST			
NO/DA/HR	POSIT	WIND	POSIT	WIND	ERRORS	POSIT	WIND	ERRORS	POSIT	WIND	ERRORS	POSIT	WIND	ERRORS	POSIT	WIND	ERRORS		
081800Z	13.5 146.4	14	0.0 0.0	0	-0.0 0.0	0.0 0.0	0	-0.0 0.0	0.0 0.0	0	-0.0 0.0	0.0 0.0	0	-0.0 0.0	0.0 0.0	0	-0.0 0.0		
081806Z	13.9 146.2	20	13.8 146.7	20	4.0	15.1 146.8	30	130.14	14.4 161.0	40	205.30	14.4 161.0	40	205.30	14.4 161.0	40	205.30		
081812Z	14.5 145.4	20	14.6 146.2	20	35.0	16.0 144.0	30	180.14	14.4 161.0	40	205.30	14.4 161.0	40	205.30	14.4 161.0	40	205.30		
081818Z	15.3 145.2	20	14.4 145.4	20	38.0	16.1 143.7	30	209.14	14.4 161.0	40	205.30	14.4 161.0	40	205.30	14.4 161.0	40	205.30		
081900Z	16.1 144.4	20	15.7 144.7	20	25.0	17.4 141.0	30	165.20	14.4 161.0	40	205.30	14.4 161.0	40	205.30	14.4 161.0	40	205.30		
081906Z	17.1 143.0	20	17.0 143.4	20	3.0	19.1 140.3	15	120.4	14.4 161.0	40	205.30	14.4 161.0	40	205.30	14.4 161.0	40	205.30		
081912Z	18.1 143.0	20	17.9 143.1	20	13.0	0.0 0.0	0	-0.0 0.0	14.4 161.0	40	205.30	14.4 161.0	40	205.30	14.4 161.0	40	205.30		
081918Z	19.2 142.0	15	18.4 142.2	20	43.5	0.0 0.0	0	-0.0 0.0	14.4 161.0	40	205.30	14.4 161.0	40	205.30	14.4 161.0	40	205.30		
082000Z	20.0 140.0	10	19.5 140.4	20	41.10	0.0 0.0	0	-0.0 0.0	14.4 161.0	40	205.30	14.4 161.0	40	205.30	14.4 161.0	40	205.30		
082006Z	21.0 139.4	10	19.4 140.1	20	77.10	0.0 0.0	0	-0.0 0.0	14.4 161.0	40	205.30	14.4 161.0	40	205.30	14.4 161.0	40	205.30		

## TROPICAL STORM KEN

BEST TRACK				ARRIVING				24 HOUR FORECAST				48 HOUR FORECAST				72 HOUR FORECAST			
MO/DA/HZ	POSIT	WIND		POSIT	WIND	POSIT	WIND	POSIT	WIND	POSIT	WIND	POSIT	WIND	POSIT	WIND	POSIT	WIND		
000000Z	22.3 142.0	15	0.0 0.0	0.0 0.0	0.0 0.0	0.0 0.0	0.0 0.0	0.0 0.0	0.0 0.0	0.0 0.0	0.0 0.0	0.0 0.0	0.0 0.0	0.0 0.0	0.0 0.0	0.0 0.0	0.0 0.0		
000006Z	22.3 141.5	15	0.0 0.0	0.0 0.0	0.0 0.0	0.0 0.0	0.0 0.0	0.0 0.0	0.0 0.0	0.0 0.0	0.0 0.0	0.0 0.0	0.0 0.0	0.0 0.0	0.0 0.0	0.0 0.0	0.0 0.0		
000012Z	22.4 140.1	15	0.0 0.0	0.0 0.0	0.0 0.0	0.0 0.0	0.0 0.0	0.0 0.0	0.0 0.0	0.0 0.0	0.0 0.0	0.0 0.0	0.0 0.0	0.0 0.0	0.0 0.0	0.0 0.0	0.0 0.0		
000018Z	23.3 138.0	15	0.0 0.0	0.0 0.0	0.0 0.0	0.0 0.0	0.0 0.0	0.0 0.0	0.0 0.0	0.0 0.0	0.0 0.0	0.0 0.0	0.0 0.0	0.0 0.0	0.0 0.0	0.0 0.0	0.0 0.0		
000024Z	23.7 137.4	20	0.0 0.0	0.0 0.0	0.0 0.0	0.0 0.0	0.0 0.0	0.0 0.0	0.0 0.0	0.0 0.0	0.0 0.0	0.0 0.0	0.0 0.0	0.0 0.0	0.0 0.0	0.0 0.0	0.0 0.0		
000030Z	24.0 136.4	20	0.0 0.0	0.0 0.0	0.0 0.0	0.0 0.0	0.0 0.0	0.0 0.0	0.0 0.0	0.0 0.0	0.0 0.0	0.0 0.0	0.0 0.0	0.0 0.0	0.0 0.0	0.0 0.0	0.0 0.0		
000036Z	24.6 135.4	20	0.0 0.0	0.0 0.0	0.0 0.0	0.0 0.0	0.0 0.0	0.0 0.0	0.0 0.0	0.0 0.0	0.0 0.0	0.0 0.0	0.0 0.0	0.0 0.0	0.0 0.0	0.0 0.0	0.0 0.0		
000042Z	24.6 134.4	20	0.0 0.0	0.0 0.0	0.0 0.0	0.0 0.0	0.0 0.0	0.0 0.0	0.0 0.0	0.0 0.0	0.0 0.0	0.0 0.0	0.0 0.0	0.0 0.0	0.0 0.0	0.0 0.0	0.0 0.0		
000048Z	24.8 134.1	25	25.4 132.4	25.105	0.0	27.4 129.4	35.200	0.0	28.4 126.4	40.200	0.0	29.4 123.4	45.200	0.0	30.4 120.4	50.200	0.0		
000054Z	24.9 133.4	25	25.3 132.4	25.37	0.0	25.8 130.4	35.60	0.0	27.4 128.4	40.100	0.0	29.4 126.4	45.100	0.0	31.4 124.4	50.100	0.0		
000100Z	25.1 133.4	25	25.3 132.4	25.43	0.0	25.8 130.4	35.80	0.0	27.4 128.4	40.100	0.0	29.4 126.4	45.100	0.0	31.4 124.4	50.100	0.0		
000106Z	25.3 132.4	25	25.3 131.4	25.43	0.0	26.4 129.4	35.111	0.0	28.4 127.4	40.151	0.0	30.4 125.4	45.151	0.0	32.4 123.4	50.151	0.0		
000112Z	25.8 131.4	30	25.5 131.7	30.13	0.0	26.4 129.4	40.151	0.0	28.4 127.4	45.151	0.0	30.4 125.4	45.100	0.0	32.4 123.4	50.100	0.0		
000118Z	26.5 131.2	35	26.2 131.0	30.42	-5.0	28.4 130.4	40.98	0.0	30.4 130.4	45.61	0.0	32.4 128.4	50.205	0.0	34.4 126.4	55.205	0.0		
000124Z	27.2 130.4	40	27.2 130.4	40.0	0.0	30.4 130.4	50.79	0.0	32.4 128.4	55.79	0.0	34.4 126.4	60.79	0.0	36.4 124.4	65.79	0.0		
000130Z	27.8 130.4	45	28.1 130.4	45.21	5.0	31.4 130.4	60.137	0.0	33.4 128.4	65.137	0.0	35.4 126.4	70.137	0.0	37.4 124.4	75.137	0.0		
000136Z	28.8 130.2	45	28.8 130.2	40.13	-5.0	32.4 131.4	70.173	0.0	34.4 129.4	75.173	0.0	36.4 127.4	80.173	0.0	38.4 125.4	85.173	0.0		
000142Z	30.0 130.4	45	29.4 130.2	40.16	-20.0	33.4 132.4	80.137	0.0	35.4 130.4	85.137	0.0	37.4 128.4	90.137	0.0	39.4 126.4	95.137	0.0		
000148Z	31.3 131.1	55	31.5 131.2	40.13	-15.0	0.0 0.0	0.0 0.0	0.0	0.0 0.0	0.0 0.0	0.0	0.0 0.0	0.0 0.0	0.0	0.0 0.0	0.0 0.0	0.0		
000154Z	32.5 131.0	55	32.7 132.0	35.13	-10.0	0.0 0.0	0.0 0.0	0.0	0.0 0.0	0.0 0.0	0.0	0.0 0.0	0.0 0.0	0.0	0.0 0.0	0.0 0.0	0.0		
000200Z	34.0 133.4	30	34.0 133.0	30.25	0.0	0.0 0.0	0.0 0.0	0.0	0.0 0.0	0.0 0.0	0.0	0.0 0.0	0.0 0.0	0.0	0.0 0.0	0.0 0.0	0.0		
000206Z	35.2 134.4	25	0.0 0.0	0.0 0.0	0.0	0.0 0.0	0.0 0.0	0.0	0.0 0.0	0.0 0.0	0.0	0.0 0.0	0.0 0.0	0.0	0.0 0.0	0.0 0.0	0.0		
000212Z	36.5 136.4	25	0.0 0.0	0.0 0.0	0.0	0.0 0.0	0.0 0.0	0.0	0.0 0.0	0.0 0.0	0.0	0.0 0.0	0.0 0.0	0.0	0.0 0.0	0.0 0.0	0.0		

ALL FORECASTS  
 WINDG 24-HR 48-HR 72-HR  
 AVG FORECAST POSIT ERROR 29. 116. 273. 414.  
 AVG RIGHT ANGLE ERROR 13. 40. 111. 104.  
 AVG INTENSITY MAGNITUDE ERROR 5. 6. 14. 7.  
 AVG INTENSITY BIAS -3. -2. -5. 7.  
 NUMBER OF FORECASTS 17 10 7 3

## TYPHOON LOLA

BEST TRACK				ARRIVING				24 HOUR FORECAST				48 HOUR FORECAST				72 HOUR FORECAST			
MO/DA/HZ	POSIT	WIND		POSIT	WIND		POSIT	WIND	POSIT	WIND	POSIT	WIND	POSIT	WIND	POSIT	WIND	POSIT	WIND	
000200Z	21.3 141.7	25	0.0 0.0	0.0 0.0	0.0	0.0	0.0 0.0	0.0	0.0 0.0	0.0	0.0 0.0	0.0	0.0 0.0	0.0	0.0 0.0	0.0	0.0 0.0	0.0	
000206Z	21.5 141.4	25	0.0 0.0	0.0 0.0	0.0	0.0	0.0 0.0	0.0	0.0 0.0	0.0	0.0 0.0	0.0	0.0 0.0	0.0	0.0 0.0	0.0	0.0 0.0	0.0	
000212Z	21.8 151.4	30	21.4 151.2	30.11	0.0	24.4 150.4	45.80	0.0	26.4 150.4	45.100	0.0	27.4 151.0	45.277	-25.0	29.0 142.2	45.447	-35.0	30.0 142.2	45.447
000218Z	22.1 151.3	30	22.6 150.7	30.45	0.0	25.2 140.4	45.100	0.0	27.2 138.4	50.100	0.0	28.4 136.4	55.100	0.0	30.4 134.4	60.100	0.0	32.4 132.4	65.100
000224Z	22.4 141.1	30	22.6 140.4	30.62	0.0	23.0 147.4	40.61	0.0	25.4 145.4	45.61	0.0	27.4 143.4	50.61	0.0	29.4 141.4	55.61	0.0	31.4 139.4	60.61
000230Z	22.8 140.7	30	22.5 140.4	30.21	0.0	23.2 140.4	45.81	0.0	25.4 138.4	50.81	0.0	27.4 136.4	55.81	0.0	29.4 134.4	60.81	0.0	31.4 132.4	65.81
000236Z	23.1 140.3	30	22.5 140.4	30.37	0.0	23.2 140.4	45.131	0.0	25.4 138.4	50.131	0.0	27.4 136.4	55.131	0.0	29.4 134.4	60.131	0.0	31.4 132.4	65.131
000242Z	23.4 140.7	35	23.1 140.2	30.33	-5.0	24.4 140.4	45.98	0.0	26.4 138.4	50.98	0.0	28.4 136.4	55.98	0.0	30.4 134.4	60.98	0.0	32.4 132.4	65.98
000248Z	23.7 140.0	45	23.6 140.1	45.9	0.0	25.2 140.4	50.81	0.0	27.2 138.4	55.81	0.0	29.2 136.4	60.81	0.0	31.2 134.4	65.81	0.0	33.2 132.4	70.81
000254Z	24.0 140.4	50	24.0 140.4	50.0	0.0	25.4 140.4	55.32	0.0	27.4 138.4	60.32	0.0	29.4 136.4	65.32	0.0	31.4 134.4	70.32	0.0	33.4 132.4	75.32
000300Z	24.4 147.4	45	24.7 147.7	45.8	0.0	26.4 146.4	65.72	0.0	28.4 144.4	70.72	0.0	30.4 142.4	75.72	0.0	32.4 140.4	80.72	0.0	34.4 138.4	85.72
000306Z	24.7 147.1	70	24.7 146.0	70.11	0.0	26.4 146.4	75.123	0.0	28.4 144.4	80.123	0.0	30.4 142.4	85.123	0.0	32.4 140.4	90.123	0.0	34.4 138.4	95.123
000312Z	25.3 146.7	75	25.2 146.4	75.12	0.0	27.4 144.4	85.133	0.0	29.4 142.4	90.133	0.0	31.4 140.4	95.133	0.0	33.4 138.4	100.133	0.0	35.4 136.4	105.133
000318Z	25.6 146.4	75	25.8 146.0	75.34	0.0	27.4 144.4	85.137	0.0	29.4 142.4	90.137	0.0	31.4 140.4	95.137	0.0	33.4 138.4	100.137	0.0	35.4 136.4	105.137
000324Z	26.3 146.4	75	26.4 146.7	75.12	0.0	29.4 144.4	90.49	0.0	31.4 142.4	95.49	0.0	33.4 140.4	100.49	0.0	35.4 138.4	105.49	0.0	37.4 136.4	110.49
000330Z	26.8 146.4	80	27.0 146.4	80.13	0.0	29.4 147.4	95.59	0.0	31.4 145.4	100.59	0.0	33.4 143.4	105.59	0.0	35.4 141.4	110.59	0.0	37.4 139.4	115.59
000336Z	27.4 146.4	85	27.3 146.4	80.6	-5.0	29.4 147.4	95.55	0.0	31.4 145.4	100.55	0.0	33.4 143.4	105.55	0.0	35.4 141.4	110.55	0.0	37.4 139.4	115.55
000342Z	27.8 146.4	90	27.9 146.4	90.9	0.0	30.4 147.4	100.69	0.0	32.4 145.4	105.69	0.0	34.4 143.4	110.69	0.0	36.4 141.4	115.69	0.0	38.4 139.4	120.69
000348Z	28.5 146.7	90	28.5 146.4	90.5	0.0	31.4 148.4	105.82	0.0	33.4 146.4	110.82	0.0	35.4 144.4	115.82	0.0	37.4 142.4	120.82	0.0	39.4 140.4	125.82
000354Z	29.3 146.7	80	29.3 146.7	85.8	5.0	31.4 148.4	105.78	0.0	33.4 146.4	110.78	0.0	35.4 144.4	115.78	0.0	37.4 142.4	120.78	0.0	39.4 140.4	125.78
000400Z	30.1 146.4	85	30.2 146.7	85.9	0.0	32.4 148.4	110.119	0.0	34.4 146.4	115.119	0.0	36.4 144.4	120.119	0.0	38.4 142.4	125.119	0.0	40.4 140.4	130.119
000406Z	30.8 146.4	80	30.8 146.4	80.10	0.0	33.4 148.4	115.130	0.0	35.4 146.4	120.130	0.0	37.4 144.4	125.130	0.0	39.4 142.4	130.130	0.0	41.4 140.4	135.130
000412Z	31.7 147.0	55	31.7 147.2	55.10	0.0	33.4 152.4	120.134	0.0	35.4 150.4	125.134	0.0	37.4 148.4	130.134	0.0	39.4 146.4	135.134	0.0	41.4 144.4	140.134
000418Z	33.0 147.7	45	33.0 147.7	45.0	0.0	0.0 0.0	0.0	0.0	0.0 0.0	0.0	0.0	0.0 0.0	0.0	0.0	0.0 0.0	0.0	0.0	0.0 0.0	0.0
000424Z	34.4 148.4	40	34.2 148.4	40.21	0.0	0.0 0.0	0.0	0.0	0.0 0.0	0.0	0.0	0.0 0.0	0.0	0.0	0.0 0.0	0.0	0.0	0.0 0.0	0.0
000430Z	35.1 148.7	35	0.0 0.0	0.0	0.0	0.0 0.0	0.0	0.0	0.0 0.0	0.0	0.0	0.0 0.0	0.0	0.0	0.0 0.0	0.0	0.0	0.0 0.0	0.0
000436Z	35.9 151.4	30	0.0 0.0	0.0	0.0	0.0 0.0	0.0	0.0	0.0 0.0	0.0	0.0	0.0 0.0	0.0	0.0	0.0 0.0	0.0	0.0	0.0 0.0	0.0
000442Z	35.1 151.4	30	0.0 0.0	0.0	0.0	0.0 0.0	0.0	0.0	0.0 0.0	0.0	0.0	0.0 0.0	0.0	0.0	0.0 0.0	0.0	0.0	0.0 0.0	0.0
000448Z	36.6 143.4	30	0.0 0.0	0.0	0.0	0.0 0.0	0.0	0.0	0.0 0.0	0.0	0.0	0.0 0.0	0.0	0.0	0.0 0.0	0.0	0.0	0.0 0.0	0.0
000454Z	37.1 145.1	30	0.0 0.0	0.0	0.0	0.0 0.0	0.0	0.0	0.0 0.0	0.0	0.0	0.0 0.0	0.0	0.0	0.0 0.0	0.0	0.0	0.0 0.0	0.0

# TYPHOON MAC

BEST TRACK				WARNING				24 HOUR FORECAST				48 HOUR FORECAST				72 HOUR FORECAST			
NO/DA/MN	POSIT	WIND		POSIT	WIND	DST	WIND	POSIT	WIND	DST	WIND	POSIT	WIND	DST	WIND	POSIT	WIND	DST	WIND
0913007	12.0 170.0	15	0.0 0.0	0	-0.0	0.0	0.0	0.0 0.0	0	-0.0	0.0	0.0 0.0	0	-0.0	0.0	0.0 0.0	0	-0.0	0.0
0913007	12.0 170.0	15	0.0 0.0	0	-0.0	0.0	0.0	0.0 0.0	0	-0.0	0.0	0.0 0.0	0	-0.0	0.0	0.0 0.0	0	-0.0	0.0
0913122	11.9 177.0	15	0.0 0.0	0	-0.0	0.0	0.0	0.0 0.0	0	-0.0	0.0	0.0 0.0	0	-0.0	0.0	0.0 0.0	0	-0.0	0.0
0913182	11.9 177.0	15	0.0 0.0	0	-0.0	0.0	0.0	0.0 0.0	0	-0.0	0.0	0.0 0.0	0	-0.0	0.0	0.0 0.0	0	-0.0	0.0
0913002	11.8 176.0	15	0.0 0.0	0	-0.0	0.0	0.0	0.0 0.0	0	-0.0	0.0	0.0 0.0	0	-0.0	0.0	0.0 0.0	0	-0.0	0.0
0913002	11.8 175.7	15	0.0 0.0	0	-0.0	0.0	0.0	0.0 0.0	0	-0.0	0.0	0.0 0.0	0	-0.0	0.0	0.0 0.0	0	-0.0	0.0
0913122	11.8 176.0	15	0.0 0.0	0	-0.0	0.0	0.0	0.0 0.0	0	-0.0	0.0	0.0 0.0	0	-0.0	0.0	0.0 0.0	0	-0.0	0.0
0913182	12.0 173.0	15	0.0 0.0	0	-0.0	0.0	0.0	0.0 0.0	0	-0.0	0.0	0.0 0.0	0	-0.0	0.0	0.0 0.0	0	-0.0	0.0
0913002	12.3 173.0	15	0.0 0.0	0	-0.0	0.0	0.0	0.0 0.0	0	-0.0	0.0	0.0 0.0	0	-0.0	0.0	0.0 0.0	0	-0.0	0.0
0913002	12.7 171.0	15	0.0 0.0	0	-0.0	0.0	0.0	0.0 0.0	0	-0.0	0.0	0.0 0.0	0	-0.0	0.0	0.0 0.0	0	-0.0	0.0
0913122	12.9 171.0	20	13.0 171.0	20	5	0	14.0 177.0	30	70	30	14.0 170.0	40	147	-25	14.0 170.0	50	172	0	
0913182	13.2 170.0	30	13.3 170.0	20	0	-10	15.1 170.0	30	40	30	17.0 173.0	40	210	-15	14.0 170.0	40	170	-5	
0913002	13.5 170.0	40	13.4 170.0	25	12	-15	15.3 170.0	30	40	40	17.0 172.0	40	212	-10	14.2 170.0	40	170	5	
0913002	13.7 170.0	50	13.4 170.0	30	0	-5	15.4 170.0	30	40	50	17.0 170.0	40	210	-10	14.2 170.0	40	170	5	
0913122	13.7 170.0	50	14.1 170.0	30	30	-10	15.7 170.0	30	40	50	17.2 170.0	40	210	-10	14.2 170.0	40	170	5	
0913182	13.7 170.0	50	14.1 170.0	30	30	-10	15.7 170.0	30	40	50	17.2 170.0	40	210	-10	14.2 170.0	40	170	5	
0917002	13.7 170.0	70	14.5 170.0	35	90	-15	15.9 170.0	35	40	50	17.4 170.0	40	210	-10	14.5 170.0	40	170	5	
0917002	13.7 170.0	70	14.5 170.0	35	90	-15	15.9 170.0	35	40	50	17.4 170.0	40	210	-10	14.5 170.0	40	170	5	
0917122	13.8 170.0	60	13.8 170.0	35	0	-10	16.0 170.0	35	40	50	17.4 170.0	40	210	-10	14.5 170.0	40	170	5	
0917182	14.0 170.0	50	13.0 170.0	35	13	0	16.0 170.0	35	40	50	17.4 170.0	40	210	-10	14.5 170.0	40	170	5	
0918002	13.8 173.0	50	14.0 173.0	35	13	5	16.7 173.0	40	40	50	17.4 170.0	40	210	-10	14.5 170.0	40	170	5	
0918002	13.6 173.0	50	14.0 173.0	35	30	5	16.0 170.0	35	30	50	17.4 170.0	40	210	-10	14.5 170.0	40	170	5	
0918122	13.6 172.0	50	13.2 172.0	35	24	5	16.0 170.0	35	40	20	16.0 170.0	35	150	25	14.0 170.0	40	170	5	
0918182	13.7 172.0	45	13.7 172.0	30	5	5	16.2 170.0	35	70	20	16.1 170.0	35	173	30	14.7 170.0	40	170	5	
0919002	13.9 171.0	40	13.4 171.0	30	0	0	16.4 170.0	30	100	10	16.3 170.0	35	202	25	14.7 170.0	40	170	5	
0919002	14.3 170.0	30	13.4 170.0	30	30	5	16.4 170.0	35	150	5	16.9 170.0	35	227	20	14.8 170.0	40	170	5	
0919122	14.8 170.0	30	14.4 170.0	35	33	0	16.9 170.0	35	150	5	16.9 170.0	35	227	20	14.8 170.0	40	170	5	
0919182	15.5 170.0	35	14.6 170.0	35	67	0	16.9 170.0	35	150	5	16.9 170.0	35	227	20	14.8 170.0	40	170	5	
0920002	16.1 170.0	40	16.0 170.0	35	24	-5	17.0 170.0	35	100	5	16.9 170.0	35	227	20	14.8 170.0	40	170	5	
0920002	17.1 170.0	40	17.2 170.0	30	14	-10	18.0 170.0	40	110	5	16.9 170.0	35	227	20	14.8 170.0	40	170	5	
0920122	17.6 170.0	30	17.5 170.0	30	13	-5	0.0 0.0	0	-0.0	0.0	0.0 0.0	0	-0.0	0.0	0.0 0.0	0	-0.0	0.0	
0920182	17.9 170.0	30	18.3 170.0	30	29	0	0.0 0.0	0	-0.0	0.0	0.0 0.0	0	-0.0	0.0	0.0 0.0	0	-0.0	0.0	
0921002	18.4 170.0	30	18.3 170.0	30	6	0	20.0 170.0	45	30	10	0.0 0.0	0	-0.0	0.0	0.0 0.0	0	-0.0	0.0	
0921002	19.0 170.0	30	18.4 170.0	30	26	-5	20.0 170.0	45	30	10	0.0 0.0	0	-0.0	0.0	0.0 0.0	0	-0.0	0.0	
0921122	19.5 170.0	40	19.2 170.0	30	29	-10	0.0 0.0	0	-0.0	0.0	0.0 0.0	0	-0.0	0.0	0.0 0.0	0	-0.0	0.0	
0921182	20.1 170.0	40	19.5 170.0	30	42	-10	0.0 0.0	0	-0.0	0.0	0.0 0.0	0	-0.0	0.0	0.0 0.0	0	-0.0	0.0	
0922002	20.5 170.0	40	20.5 170.0	30	6	-10	22.0 170.0	45	40	10	0.0 0.0	0	-0.0	0.0	0.0 0.0	0	-0.0	0.0	
0922002	20.8 170.0	35	21.0 170.0	30	12	-5	22.0 170.0	45	40	10	0.0 0.0	0	-0.0	0.0	0.0 0.0	0	-0.0	0.0	
0922122	20.9 170.0	35	21.3 170.0	30	25	-5	22.0 170.0	45	40	10	0.0 0.0	0	-0.0	0.0	0.0 0.0	0	-0.0	0.0	
0922182	21.2 170.0	35	21.7 170.0	30	11	0	22.1 170.0	45	40	10	0.0 0.0	0	-0.0	0.0	0.0 0.0	0	-0.0	0.0	
0923002	21.5 170.0	40	21.5 170.0	35	11	-5	22.7 170.0	45	40	10	0.0 0.0	0	-0.0	0.0	0.0 0.0	0	-0.0	0.0	
0923002	21.8 170.0	40	21.8 170.0	35	5	0	0.0 0.0	0	-0.0	0.0	0.0 0.0	0	-0.0	0.0	0.0 0.0	0	-0.0	0.0	
0923122	22.0 170.0	30	22.0 170.0	35	44	0	0.0 0.0	0	-0.0	0.0	0.0 0.0	0	-0.0	0.0	0.0 0.0	0	-0.0	0.0	
0923182	22.3 170.0	30	22.3 170.0	30	5	0	0.0 0.0	0	-0.0	0.0	0.0 0.0	0	-0.0	0.0	0.0 0.0	0	-0.0	0.0	
0924002	22.5 170.0	25	22.5 170.0	25	5	0	0.0 0.0	0	-0.0	0.0	0.0 0.0	0	-0.0	0.0	0.0 0.0	0	-0.0	0.0	

## ALL FORECASTS

	MMMG	24-48	60-72	72-96
AVG FORECAST POSIT ERROR	23	93	194	278
AVG 45G-1 ANGLE ERROR	16	66	152	237
AVG INTENSITY MAGNITUDE ERROR	5	12	13	21
AVG INTENSITY MAX	-6	-5	4	21
NUMBER OF FORECASTS	34	27	19	19

## TROPICAL STORM NANCY

BEST TRACK				WARNING				24 HOUR FORECAST				48 HOUR FORECAST				72 HOUR FORECAST			
NO/DA/MN	POSIT	WIND		POSIT	WIND	DST	WIND	POSIT	WIND	DST	WIND	POSIT	WIND	DST	WIND	POSIT	WIND	DST	WIND
0917122	16.0	113.0	20	0.0	0.0	0	-0.0	0.0	0.0	0	-0.0	0.0	0.0	0	-0.0	0.0	0.0	0	-0.0
0917182	16.0	112.0	20	0.0	0.0	0	-0.0	0.0	0.0	0	-0.0	0.0	0.0	0	-0.0	0.0	0.0	0	-0.0
0918002	17.3	111.0	20	0.0	0.0	0	-0.0	0.0	0.0	0	-0.0	0.0	0.0	0	-0.0	0.0	0.0	0	-0.0
0918062	17.7	111.0	20	0.0	0.0	0	-0.0	0.0	0.0	0	-0.0	0.0	0.0	0	-0.0	0.0	0.0	0	-0.0
0918122	18.1	111.0	20	0.0	0.0	0	-0.0	0.0	0.0	0	-0.0	0.0	0.0	0	-0.0	0.0	0.0	0	-0.0
0918182	18.4	111.0	30	0.0	0.0	0	-0.0	0.0	0.0	0	-0.0	0.0	0.0	0	-0.0	0.0	0.0	0	-0.0
0919002	18.0	111.0	30	0.0	0.0	0	-0.0	0.0	0.0	0	-0.0	0.0	0.0	0	-0.0	0.0	0.0	0	-0.0
0919062	18.6	111.0	30	18.5	111.0	30	24	-5	20.0	112.0	45	20	10	20.2	110.0	45	300	0	0.0
0919122	18.6	110.0	30	18.4	110.0	45	13	10	19.3	110.0	45	30	10	20.1	108.0	40	170	15	20.0
0919182	18.7	110.0	45	19.3	110.0	30	36	5	20.1	108.0	45	130	10	20.0	107.0	30	190	20	0.0
0920002	18.7	109.0	35	18.7	109.0	40	21	5	18.4	108.0	30	130	-5	18.2	104.0	25	141	-5	0.0
0920062	18.4	109.0	15	18.4	109.0	40	26	5	19.3	108.0	35	130	0	0.0	0.0	0	-0.0	0.0	0.0
0920122	18.2	109.0	35	18.4	108.0	35	24	0	18.3	108.0	30	70	-5	0.0	0.0	0	-0.0	0.0	0.0
0920182	17.9	109.0	35	18.3	108.0	35	56	0	18.2	108.0	25	120	-5	0.0	0.0	0	-0.0	0.0	0.0
0921002	17.7	108.0	35	17.5	108.0	35	36	0	15.0	108.0	20	180	10	0.0	0.0	0	-0.0	0.0	0.0
0921062	17.6	108.0	35	17.4	107.0	35	31	0	0.0	0.0	0	-0.0	0.0	0	-0.0	0.0	0	-0.0	0.0
0921122	17.6	107.0	35	18.0	106.0	35	36	0	17.4	106.0	25	30	0	0.0	0.0	0	-0.0	0.0	0.0
0921182	17.3	107.0	30	17.7	107.0	30	29	0	0.0	0.0	0	-0.0	0.0	0	-0.0	0.0	0	-0.0	0.0
0922002	17.2	107.0	30	17.3	107.0	25	13	-5	0.0	0.0	0	-0.0	0.0	0	-0.0	0.0	0	-0.0	0.0
0922062	17.1	107.0	30	17.3	106.0	25	17	-5	0.0	0.0	0	-0.0	0.0	0	-0.0	0.0	0	-0.0	0.0
0922122	16.9	106.0	20	16.5	106.0	20	24	0	0.0	0.0	0	-0.0	0.0	0	-0.0	0.0	0	-0.0	0.0

# TYPHOON OWEN

BEST TRACK				WINDING				24 HOUR FORECAST				48 HOUR FORECAST				72 HOUR FORECAST			
NO/JA/MO	POSIT	WIND		POSIT	WIND		POSIT	WIND	USE	WIND	POSIT	WIND	USE	WIND	POSIT	WIND	USE	WIND	
092200Z	12.6 138.3	20		13.0 138.0	20	58	0	13.4 138.0	40	12.3 138	15	14.1 131.8	00	229	15	14.9 128.6	70	14.1	0
092206Z	12.5 138.1	25		12.9 138.0	25	25	0	13.4 138.0	45	11.9 138	15	14.6 131.7	00	229	5	14.9 128.6	70	14.1	0
092212Z	12.1 137.7	25		12.5 137.1	25	33	0	12.9 138.0	35	14.1	0	13.4 130.9	05	137	-15	14.5 128.2	55	14.0	-25
092218Z	12.1 137.2	25		12.3 136.7	25	54	0	12.7 137.7	35	226	-10	13.6 129.1	50	426	-10	14.3 126.0	60	479	-40
092300Z	12.6 146.0	25		12.3 136.7	25	21	0	12.4 136.5	30	226	-10	12.7 131.2	30	407	-35	14.2 128.0	45	445	-55
092306Z	13.3 146.6	30		12.3 136.1	30	66	0	12.4 136.5	45	313	-10	12.4 130.3	35	405	-20	14.3 127.1	60	421	-50
092312Z	13.9 136.2	35		13.3 136.1	45	34	10	13.0 136.1	50	309	-10	14.7 131.6	00	445	-20	14.4 128.2	70	416	-40
092318Z	15.0 135.8	45		13.7 135.6	45	79	0	14.4 135.1	55	334	-5	15.4 129.9	05	411	-35	14.3 128.2	75	416	-40
092400Z	15.1 135.3	45		15.4 135.2	45	19	0	21.0 137.4	00	920	-10	24.4 131.1	05	142	-45	24.4 128.3	70	254	-30
092406Z	17.7 136.3	55		17.4 136.5	55	13	0	22.1 131.4	05	900	-10	24.0 131.3	70	144	-40	24.4 128.2	75	248	-20
092412Z	19.0 133.2	60		19.2 133.4	60	16	0	24.0 130.4	75	179	-5	27.4 130.2	05	240	-25	30.4 128.0	70	247	-20
092418Z	20.1 132.1	60		20.7 132.1	60	38	0	25.4 130.3	75	184	-25	24.7 130.5	05	243	-20	31.0 128.4	70	244	-15
092500Z	21.0 130.7	70		20.9 130.8	70	4	0	23.4 127.0	85	122	-25	24.2 125.4	05	239	-5	24.6 125.6	80	242	-5
092506Z	21.3 130.3	75		21.7 130.0	75	29	0	24.1 127.1	85	120	-25	24.2 125.8	05	214	0	24.3 127.0	75	100	-5
092512Z	22.0 129.8	80		21.9 129.4	80	23	0	24.7 127.0	95	130	-15	27.1 126.5	05	189	5	30.7 128.4	75	132	0
092518Z	22.6 129.4	100		22.4 129.0	90	28	-10	24.0 127.4	100	113	-5	27.4 127.0	05	141	10	30.3 128.0	70	150	-5
092600Z	23.1 129.1	110		23.3 129.2	95	13	-15	25.4 128.7	110	60	10	27.4 130.0	00	49	5	30.3 128.0	70	251	-5
092606Z	23.5 129.2	110		23.7 129.0	100	16	-10	26.0 128.4	110	71	15	24.7 131.1	05	109	5	31.2 128.1	65	244	-10
092612Z	23.8 129.3	110		24.0 129.1	100	15	-10	26.0 128.0	110	43	20	24.4 130.6	05	84	10	30.9 125.5	65	240	-10
092618Z	24.4 129.4	105		24.4 129.4	105	5	0	29.0 130.4	75	150	-10	24.4 132.1	75	135	0	31.1 127.0	55	219	-20
092700Z	24.9 129.4	100		24.8 129.4	100	12	0	26.4 129.4	95	300	10	24.4 131.7	70	99	-5	31.6 127.1	50	120	-30
092706Z	25.5 129.7	95		25.3 129.7	95	12	0	27.3 130.4	90	32	10	20.2 132.7	05	142	-10	32.3 128.0	45	247	-20
092712Z	26.0 129.8	90		25.9 129.0	90	9	0	28.3 131.1	85	80	10	40.4 131.9	05	212	-10	31.3 128.5	45	176	-10
092718Z	26.5 129.8	85		26.4 129.7	85	4	0	29.0 130.8	75	89	0	31.4 133.7	00	149	-15	34.0 128.5	45	133	0
092800Z	27.0 129.8	85		27.1 129.0	85	8	0	29.4 130.7	75	94	0	32.2 133.8	00	144	-10	34.0 128.3	40	207	5
092806Z	27.3 129.8	80		27.5 129.8	80	12	0	30.3 131.3	75	124	0	32.4 135.1	05	103	-10	34.0 0.0	0	0	0
092812Z	27.6 129.8	75		27.7 129.8	75	6	0	29.4 130.0	70	29	-5	32.1 132.0	00	149	5	34.0 0.0	0	0	0
092818Z	27.8 129.8	75		27.7 129.8	75	6	0	29.4 129.4	70	80	-5	31.2 131.2	00	446	15	34.0 0.0	0	0	0
092900Z	28.1 129.0	75		28.0 129.8	75	8	0	29.0 130.4	70	82	0	32.4 132.5	00	411	25	34.0 0.0	0	0	0
092906Z	28.5 129.1	75		28.7 129.8	75	20	0	32.0 131.5	40	80	-25	34.0 0.0	0	0	0	34.0 0.0	0	0	0
092912Z	29.1 130.3	75		29.1 130.2	75	5	0	32.3 131.4	55	197	0	34.0 0.0	0	0	0	34.0 0.0	0	0	0
092918Z	29.8 130.4	75		29.7 130.4	75	6	0	32.4 130.4	50	331	0	34.0 0.0	0	0	0	34.0 0.0	0	0	0
093000Z	30.8 131.5	70		31.0 131.5	70	12	0	35.0 130.7	40	417	-5	34.0 0.0	0	0	0	34.0 0.0	0	0	0
093006Z	32.4 133.1	45		32.0 132.4	70	39	5	0.0 0.0	0	0	0	34.0 0.0	0	0	0	34.0 0.0	0	0	0
093012Z	34.1 135.1	55		33.4 134.4	70	35	15	0.0 0.0	0	0	0	34.0 0.0	0	0	0	34.0 0.0	0	0	0
093018Z	36.2 138.1	45		35.4 137.0	50	72	5	0.0 0.0	0	0	0	34.0 0.0	0	0	0	34.0 0.0	0	0	0
100100Z	39.8 141.0	35		39.4 141.7	35	55	0	0.0 0.0	0	0	0	34.0 0.0	0	0	0	34.0 0.0	0	0	0

## A.L. FORECASTS

	24-HR	48-HR	72-HR
AVG FORECAST POSIT ERROR	25	146	250
AVG FORECAST ANGLE ERROR	15	78	154
AVG INTENSITY MAGNITUDE ERROR	2	10	15
AVG INTENSITY CLASS	-0	-3	-4
NUMBER OF FORECASTS	37	33	29

# TROPICAL STORM PAMELA

BEST TRACK				WINDING				24 HOUR FORECAST				48 HOUR FORECAST				72 HOUR FORECAST			
NO/JA/MO	POSIT	WIND		POSIT	WIND	JUST WIND		POSIT	WIND	JUST WIND		POSIT	WIND	JUST WIND		POSIT	WIND	JUST WIND	
092300Z	18.0 150.0	15		0.0 0.0	0	-0.0 0.0		0.0 0.0	0	-0.0 0.0		0.0 0.0	0	-0.0 0.0		0.0 0.0	0	-0.0 0.0	
092306Z	18.2 148.4	15		0.0 0.0	0	-0.0 0.0		0.0 0.0	0	-0.0 0.0		0.0 0.0	0	-0.0 0.0		0.0 0.0	0	-0.0 0.0	
092312Z	18.3 147.4	15		0.0 0.0	0	-0.0 0.0		0.0 0.0	0	-0.0 0.0		0.0 0.0	0	-0.0 0.0		0.0 0.0	0	-0.0 0.0	
092318Z	18.5 146.4	15		0.0 0.0	0	-0.0 0.0		0.0 0.0	0	-0.0 0.0		0.0 0.0	0	-0.0 0.0		0.0 0.0	0	-0.0 0.0	
092400Z	18.6 145.4	15		0.0 0.0	0	-0.0 0.0		0.0 0.0	0	-0.0 0.0		0.0 0.0	0	-0.0 0.0		0.0 0.0	0	-0.0 0.0	
092406Z	18.7 145.4	15		0.0 0.0	0	-0.0 0.0		0.0 0.0	0	-0.0 0.0		0.0 0.0	0	-0.0 0.0		0.0 0.0	0	-0.0 0.0	
092412Z	18.8 144.4	20		0.0 0.0	0	-0.0 0.0		0.0 0.0	0	-0.0 0.0		0.0 0.0	0	-0.0 0.0		0.0 0.0	0	-0.0 0.0	
092418Z	19.0 144.1	25		0.0 0.0	0	-0.0 0.0		0.0 0.0	0	-0.0 0.0		0.0 0.0	0	-0.0 0.0		0.0 0.0	0	-0.0 0.0	
092500Z	19.2 143.4	30		0.0 0.0	0	-0.0 0.0		0.0 0.0	0	-0.0 0.0		0.0 0.0	0	-0.0 0.0		0.0 0.0	0	-0.0 0.0	
092506Z	19.4 143.0	45		0.0 0.0	0	-0.0 0.0		0.0 0.0	0	-0.0 0.0		0.0 0.0	0	-0.0 0.0		0.0 0.0	0	-0.0 0.0	
092512Z	19.7 142.1	60	19.5 142.0	35	13	-5	21.0 139.0	0	201	-25	0.0 0.0	0	0.0	-0.0	0.0 0.0	0	0.0	-0.0	
092518Z	20.3 140.9	45	19.7 141.1	35	34	0	21.0 138.1	45	307	-25	0.0 0.0	0	0.0	-0.0	0.0 0.0	0	0.0	-0.0	
092600Z	20.4 139.4	35	20.4 139.4	35	25	0	0.0 0.0	0	0	0	0.0 0.0	0	0.0	-0.0	0.0 0.0	0	0.0	-0.0	
092606Z	22.0 137.9	30	21.4 137.0	30	25	0	0.0 0.0	0	0	0	0.0 0.0	0	0.0	-0.0	0.0 0.0	0	0.0	-0.0	
092612Z	24.1 137.4	25	23.4 136.4	30	67	5	0.0 0.0	0	0	0	0.0 0.0	0	0.0	-0.0	0.0 0.0	0	0.0	-0.0	
092618Z	26.0 136.4	20	25.0 136.8	25	0	5	0.0 0.0	0	0	0	0.0 0.0	0	0.0	-0.0	0.0 0.0	0	0.0	-0.0	

## A.L. FORECASTS

	24-HR	48-HR	72-HR
AVG FORECAST POSIT ERROR	24	146	0
AVG FORECAST ANGLE ERROR	22	15	0
AVG INTENSITY MAGNITUDE ERROR	1	25	0
AVG INTENSITY CLASS	1	0	0
NUMBER OF FORECASTS	4	2	0

TROPICAL STORM ROGER

HIST TRACK				HANNING				24 HOUR FORECAST				48 HOUR FORECAST				72 HOUR FORECAST					
NO/JA/MO	POSIT	WIND		POSIT	WIND	OST	WIND	POSIT	WIND	OST	WIND	POSIT	WIND	OST	WIND	POSIT	WIND	OST	WIND		
1002007	11.7	142.7	20	0.0	0.0	0.0	-0.0	0.0	0.0	0.0	-0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
1002007	12.0	142.1	20	0.0	0.0	0.0	-0.0	0.0	0.0	0.0	-0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
1002122	12.4	141.4	20	0.0	0.0	0.0	-0.0	0.0	0.0	0.0	-0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
1002187	13.2	140.4	24	0.0	0.0	0.0	-0.0	0.0	0.0	0.0	-0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
1003007	14.2	140.2	10	0.0	0.0	0.0	-0.0	0.0	0.0	0.0	-0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
1003007	14.1	139.4	30	15.7	134.8	25	-2.0	18.4	137.1	35	20.1	-4.0	20.4	136.0	45	45.0	22.0	145.0	55	150.0	
1003122	14.0	138.0	50	16.5	134.1	25	85.0	-2.0	20.2	137.1	35	170.0	-4.0	20.4	136.4	45	194.0	27.2	147.4	55	144.0
1003182	14.4	137.4	10	19.5	134.1	30	29.0	0.0	24.8	134.0	35	265.0	10.0	20.0	137.4	45	147.0	12.0	142.2	35	144.0
1004007	20.0	136.3	16	21.0	134.3	30	24.0	-5.0	26.0	134.4	35	365.0	10.0	11.4	134.3	25	515.0	-20.0	144.6	15	446.0
1004007	21.2	135.3	40	21.7	135.2	25	30.0	-5.0	26.4	134.4	30	379.0	4.0	11.4	134.5	30	442.0	-15.0	0.0	0.0	0.0
1004122	21.5	134.4	40	21.6	134.7	40	17.0	0.0	23.7	132.4	30	194.0	4.0	27.0	133.0	35	123.0	10.0	0.0	0.0	0.0
1004187	21.0	133.5	45	22.5	131.4	45	90.0	0.0	25.4	131.4	35	254.0	10.0	20.1	134.5	45	44.0	5.0	0.0	0.0	0.0
1005007	19.4	144.2	45	20.2	133.4	40	25.0	-5.0	23.4	134.7	30	24.0	4.0	20.0	137.8	40	140.0	5.0	0.0	0.0	0.0
1005007	20.3	135.2	45	20.2	134.7	40	29.0	-5.0	23.4	134.7	30	113.0	4.0	20.4	137.9	40	124.0	10.0	0.0	0.0	0.0
1005122	21.5	135.5	45	21.4	135.1	40	23.0	-5.0	27.2	134.1	45	44.0	4.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
1005182	22.0	135.3	45	22.4	135.8	40	36.0	-5.0	26.7	134.0	40	172.0	4.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
1006007	23.0	144.7	45	23.4	134.7	40	4.0	-5.0	29.0	134.4	35	135.0	4.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
1006007	25.2	134.4	45	25.1	134.7	40	17.0	-5.0	11.4	137.9	35	205.0	4.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
1006122	26.0	135.3	45	26.4	135.3	40	24.0	-5.0	0.0	0.0	0.0	-0.0	4.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
1006182	29.1	136.2	40	24.4	134.2	40	43.0	0.0	0.0	0.0	0.0	-0.0	4.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
1007007	32.0	137.4	15	31.4	137.4	35	14.0	0.0	0.0	0.0	0.0	-0.0	4.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
1007007	34.4	140.1	30	0.0	0.0	0.0	-0.0	0.0	0.0	0.0	0.0	-0.0	4.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

ALL FORECASTS				
MMHG	24-HR	48-HR	72-HR	
AVG FORECAST POSIT ERROR	12.	105.	251.	343.
AVG RIGHT ANGLE ERROR	19.	93.	104.	174.
AVG INTENSITY MAGNITUDE ERROR	1.	5.	7.	11.
AVG INTENSITY BIAS	-3.	0.	-1.	-1.
NUMBER OF FORECASTS	14	13	9	4

TYPHOON SARAH

BEST TRACK				JAWING				24 HOUR FORECAST				48 HOUR FORECAST				72 HOUR FORECAST						
DATE	POSIT	WIND	WAVE	POSIT	WIND	WAVE	POSIT	WIND	WAVE	POSIT	WIND	WAVE	POSIT	WIND	WAVE	POSIT	WIND	WAVE				
093012Z	14.6 119.4	14	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0				
093018Z	14.6 119.4	14	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0				
100100Z	14.5 119.4	14	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0				
100106Z	14.5 120.2	14	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0				
100112Z	14.5 120.4	14	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0				
100118Z	14.5 120.4	14	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0				
100200Z	14.7 121.0	14	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0				
100206Z	14.8 121.1	14	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0				
100212Z	14.9 121.2	14	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0				
100218Z	15.2 121.2	14	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0				
100300Z	15.2 120.4	14	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0				
100306Z	15.0 120.4	14	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0				
100312Z	14.8 120.3	14	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0				
100318Z	14.6 120.0	20	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0				
100400Z	14.4 119.7	20	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0				
100406Z	14.2 119.5	30	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0				
100412Z	13.8 119.1	30	14.0	119.7	30	37	0	13.4	118.7	35	88	-4	13.0	110.1	45	54	0	12.5	113.3	40	74	-35
100418Z	13.5 118.4	35	13.9	119.3	35	34	0	13.4	117.7	50	121	10	12.4	115.8	50	220	0	12.4	113.0	40	74	-35
100500Z	13.0 118.4	40	13.7	118.9	40	42	0	13.2	114.9	50	168	10	12.7	114.6	50	242	-10	12.2	111.4	40	43	-35
100506Z	12.7 119.0	40	12.5	118.5	40	31	0	12.5	114.4	40	70	0	11.5	118.0	40	79	-35	10.7	117.0	40	110	-35
100512Z	12.5 119.3	40	12.5	119.3	40	0	0	12.0	114.0	40	45	-5	11.1	117.9	40	44	-35	10.6	116.4	35	159	-40
100518Z	12.5 119.4	40	12.1	119.0	40	34	0	11.0	114.4	40	90	0	10.4	117.3	35	136	-40	9.9	116.3	30	141	-45
100600Z	12.5 119.7	40	12.3	119.0	40	43	0	12.1	114.7	40	41	-20	11.5	118.0	35	71	-40	10.8	117.0	30	44	-55
100606Z	12.4 119.7	40	12.4	119.0	40	12	0	12.4	120.8	35	95	-40	12.3	121.6	30	140	-45	12.4	122.4	25	277	-45
100612Z	12.3 119.4	45	12.4	120.1	35	30	-10	12.4	120.8	35	100	-40	12.4	121.6	30	175	-45	0	0	0	0	0
100618Z	12.2 119.4	40	12.4	119.4	35	21	-15	12.4	120.3	30	80	-45	12.4	121.2	20	147	-55	0	0	0	0	0
100700Z	12.2 119.4	40	12.2	119.4	35	0	-15	12.2	119.4	35	50	-40	0	0	0	0	0	0	0	0	0	0
100706Z	12.1 119.7	75	12.2	119.2	65	4	-10	11.9	114.4	60	71	-15	11.5	116.4	50	43	-40	11.3	114.3	40	119	-70
100712Z	11.9 119.7	75	12.1	119.2	65	12	-10	11.8	114.1	60	84	-15	11.6	116.5	50	56	-40	11.2	114.5	40	93	-60
100718Z	11.6 119.7	75	12.0	119.1	65	25	-10	11.8	114.4	55	53	-20	11.7	116.9	50	17	-45	10.7	114.9	40	44	-60
100800Z	11.3 119.7	75	11.7	119.1	65	4	-10	11.7	114.7	55	13	-30	11.1	117.3	50	42	-60	11.1	116.5	40	76	-60
100806Z	11.0 119.7	75	11.1	119.2	65	6	-10	10.8	114.0	60	43	-30	10.7	116.6	50	57	-55	10.8	115.2	50	78	-60
100812Z	10.8 119.7	75	10.4	119.1	65	0	-10	10.1	114.0	60	80	-30	10.1	116.4	50	93	-45	10.2	114.4	50	119	-75
100818Z	11.0 118.4	75	10.4	119.1	65	30	-10	10.7	114.2	65	90	-30	10.0	116.6	50	117	-45	10.3	115.0	50	129	-75
100900Z	11.1 118.4	45	10.6	118.2	65	32	-20	10.4	114.7	70	72	-40	10.4	114.3	65	45	-35	11.6	112.3	65	127	-10
100906Z	11.3 117.4	90	11.3	117.8	90	0	0	11.4	114.8	85	21	-25	11.4	115.4	80	35	-10	11.8	114.2	80	70	10
100912Z	11.4 117.4	90	11.5	117.4	90	12	0	11.8	114.8	85	13	-15	12.2	114.3	80	29	-5	12.8	112.7	80	79	15
100918Z	11.4 117.1	95	11.7	116.9	90	21	-5	12.3	114.0	85	50	-15	12.4	113.0	80	42	-5	13.0	111.0	80	111	15
101000Z	11.5 116.7	110	11.4	116.3	90	24	-20	11.4	113.4	85	104	-15	11.5	111.4	80	175	-5	11.5	109.9	80	241	20
101006Z	11.6 116.3	110	11.6	116.4	100	6	-10	11.0	114.4	100	37	10	12.0	112.5	90	93	20	12.1	110.4	90	126	30
101012Z	11.7 116.0	100	11.6	115.0	100	8	0	11.4	114.0	100	54	15	12.0	112.0	90	100	25	12.1	110.0	80	126	20
101018Z	11.8 115.4	100	11.9	115.3	100	30	0	12.2	113.7	100	48	25	12.5	111.7	90	81	25	12.6	109.6	75	100	15
101100Z	11.9 115.4	100	12.0	115.4	90	4	-10	12.4	114.4	75	29	0	13.0	112.9	70	25	10	13.3	111.3	60	41	5
101106Z	12.1 115.1	40	12.0	114.0	90	13	0	12.4	113.0	75	55	5	12.6	110.9	70	85	10	12.6	108.9	60	76	10
101112Z	12.2 114.8	45	12.1	114.7	90	30	5	12.3	111.4	75	95	10	12.4	109.8	60	126	0	12.4	107.7	20	123	-20
101118Z	12.4 114.4	75	12.5	113.0	85	36	10	13.0	111.3	65	94	0	13.2	109.3	50	105	790	0	0	0	0	0
101200Z	12.8 114.1	75	12.4	114.2	80	25	5	12.4	112.4	65	48	5	12.9	111.0	50	79	-5	13.2	109.3	40	75	20
101206Z	12.9 113.4	70	13.0	113.4	80	13	10	13.4	112.1	65	6	5	13.4	110.5	50	42	0	0	0	0	0	0
101212Z	13.1 113.3	65	13.3	113.2	80	13	15	14.0	111.5	65	38	5	14.4	109.9	50	40	15	0	0	0	0	0
101218Z	13.2 112.0	65	13.5	112.5	75	29	10	14.4	110.3	65	70	5	14.7	108.3	30	101	-5	0	0	0	0	0
101300Z	13.3 112.4	60	13.3	112.1	75	23	15	13.2	110.2	55	26	0	13.1	108.2	30	29	10	0	0	0	0	0
101306Z	13.4 112.1	60	13.2	112.0	75	13	15	13.1	110.1	55	14	5	0	0	0	0	0	0	0	0	0	0
101312Z	13.4 111.7	60	13.5	111.4	70	13	10	13.4	109.4	55	30	5	0	0	0	0	0	0	0	0	0	0
101318Z	13.4 111.1	60	13.5	111.0	60	105	0	13.3	108.3	35	47	0	0	0	0	0	0	0	0	0	0	0
101400Z	13.4 110.4	55	13.5	110.9	55	19	0	13.4	108.4	30	21	10	0	0	0	0	0	0	0	0	0	0
101406Z	13.3 110.0	50	13.4	110.4	50	24	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
101412Z	13.3 109.4	50	13.3	109.4	50	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
101418Z	13.2 109.1	35	13.3	109.0	35	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
101500Z	13.1 108.7	20	13.1	108.4	20	12	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

ALL FORECASTS

	24-HR	48-HR	72-HR
AVG FORECAST POSIT ERROR	26	41	110
AVG RIGHT ANGLE ERROR	16	40	85
AVG INTENSITY MAGNITUDE ERROR	4	16	47
AVG INTENSITY BIAS	-2	-9	5
NUMBER OF FORECASTS	47	33	34

SUPER TYPHOON TIP

BEST TRACK				HARVING				24 HOUR FORECAST				48 HOUR FORECAST				72 HOUR FORECAST			
NO/JA/MO	POSIT	WIND	POSIT	WIND	POSIT	WIND	POSIT	WIND	POSIT	WIND	POSIT	WIND	POSIT	WIND	POSIT	WIND	POSIT	WIND	
1004002	6.3 154.1	24	0.0 0.0	0.0	-0.0	0.0	0.0 0.0	0.0	-0.0	0.0	0.0 0.0	0.0	-0.0	0.0	0.0 0.0	0.0	-0.0	0.0	
1004002	6.3 153.0	24	0.0 0.0	0.0	-0.0	0.0	0.0 0.0	0.0	-0.0	0.0	0.0 0.0	0.0	-0.0	0.0	0.0 0.0	0.0	-0.0	0.0	
1004122	5.7 153.3	24	0.0 0.0	0.0	-0.0	0.0	0.0 0.0	0.0	-0.0	0.0	0.0 0.0	0.0	-0.0	0.0	0.0 0.0	0.0	-0.0	0.0	
1004182	5.4 153.0	25	0.0 0.0	0.0	-0.0	0.0	0.0 0.0	0.0	-0.0	0.0	0.0 0.0	0.0	-0.0	0.0	0.0 0.0	0.0	-0.0	0.0	
1005002	5.4 154.4	25	5.4 154.4	25	0.0	0.0	6.4 152.4	30	6.0	-0.0	4.0 150.0	35	13.7	-5.0	4.3 147.1	45	2.7	0.0	
1005002	5.7 155.2	25	5.4 155.2	25	6.0	0.0	7.4 151.7	30	4.0	-0.0	0.1 150.9	35	14.4	-5.0	10.4 145.0	45	2.9	0.0	
1005122	6.5 154.4	30	6.1 155.3	25	4.8	-5.0	7.4 151.7	35	4.0	0.0	0.1 150.9	40	14.1	5.0	10.5 145.0	50	1.8	0.0	
1005182	7.1 153.4	30	6.4 155.2	25	9.0	-5.0	8.1 151.0	35	2.0	-0.0	0.4 150.0	40	14.4	5.0	10.5 147.0	50	1.0	0.0	
1006002	7.3 153.3	35	7.3 153.1	35	12.0	0.0	8.7 150.2	45	13.0	0.0	0.4 147.6	55	24.1	15.0	11.0 145.1	65	1.3	1.0	
1006002	7.5 153.1	35	7.7 152.4	35	43.0	0.0	8.9 144.4	45	20.1	0.0	10.1 147.0	55	24.2	15.0	11.3 144.4	65	1.7	1.0	
1006122	7.7 152.0	35	7.7 152.5	35	24.0	0.0	9.1 150.0	45	18.0	0.0	10.4 147.4	55	19.2	10.0	11.8 144.9	65	4.9	0.0	
1006182	7.9 152.4	40	8.1 151.0	40	43.0	0.0	9.4 140.4	50	22.3	10.0	10.7 146.9	60	15.4	10.0	12.0 144.4	70	7.4	-0.0	
1007002	7.7 152.3	40	8.0 152.1	40	14.0	0.0	9.3 150.5	50	12.0	10.0	10.7 148.0	60	30.0	10.0	12.0 145.0	70	14.0	-10.0	
1007002	7.0 152.4	40	7.3 152.5	40	19.0	0.0	8.7 151.5	45	13.0	0.0	0.4 149.4	55	24.9	0.0	11.5 146.6	70	3.0	-15.0	
1007122	6.6 151.0	40	6.9 151.7	40	21.0	0.0	8.2 149.4	45	11.0	0.0	0.4 147.3	55	24.1	-5.0	11.4 144.3	70	24.1	-20.0	
1007182	6.8 152.1	40	6.7 151.5	40	35.0	0.0	7.6 149.3	50	20.0	0.0	0.4 147.2	60	30.5	-15.0	11.0 144.4	70	24.5	-40.0	
1008002	7.0 151.0	40	6.4 152.1	40	61.0	0.0	7.7 151.3	45	33.0	10.0	0.0 149.3	70	44.8	-5.0	10.5 144.4	75	4.9	-45.0	
1008002	6.9 151.4	40	6.6 151.5	40	19.0	5.0	11.4 147.2	60	11.0	0.0	14.0 142.6	70	40.0	-15.0	14.6 143.0	75	1.9	-44.0	
1008122	9.8 150.4	45	9.7 150.3	45	19.0	0.0	12.2 144.0	60	10.0	0.0	14.5 141.6	70	46.0	-20.0	14.8 147.3	75	1.1	-44.0	
1008182	11.0 149.5	50	10.7 149.5	50	18.0	0.0	13.4 144.4	65	12.0	-10.0	15.7 141.2	70	11.2	-45.0	17.7 145.4	75	1.9	-75.0	
1009002	12.2 147.4	50	12.3 147.4	50	6.0	0.0	16.0 141.4	65	17.0	-10.0	10.0 137.2	75	31.5	-55.0	21.5 142.3	85	4.9	-75.0	
1009002	12.7 145.4	55	13.0 146.0	55	21.0	0.0	15.0 142.4	65	10.0	-20.0	10.5 136.6	80	24.8	-60.0	21.6 141.2	85	4.5	-80.0	
1009122	12.8 146.3	60	12.9 146.3	60	0.0	0.0	14.1 134.7	65	14.1	-20.0	14.5 133.7	80	32.0	-60.0	14.2 142.6	85	4.4	-80.0	
1009182	12.9 143.4	75	12.9 143.2	65	13.0	-10.0	13.2 134.4	75	11.0	-40.0	14.2 133.3	85	37.5	-65.0	14.0 142.6	90	5.1	-44.0	
1010002	13.1 142.5	80	13.0 142.4	80	4.0	0.0	13.7 134.4	100	7.0	-30.0	14.6 134.0	115	24.0	-45.0	14.7 149.3	130	40.0	-15.0	
1010002	13.5 141.7	85	13.1 141.4	85	25.0	0.0	13.0 137.3	105	12.0	-30.0	14.7 132.9	120	30.3	-45.0	14.8 148.6	130	41.0	0.0	
1010122	13.7 141.1	90	13.7 140.0	95	12.0	5.0	14.3 134.1	110	8.0	-30.0	15.1 134.1	125	20.8	-40.0	14.2 141.3	130	21.1	0.0	
1010182	13.9 140.3	115	14.3 140.0	100	30.0	-15.0	15.4 137.0	115	11.0	-30.0	14.6 133.5	125	19.8	-30.0	17.1 149.0	130	34.0	0.0	
1011002	14.2 139.4	130	14.3 139.4	100	8.0	-30.0	15.2 134.3	145	13.0	-10.0	14.3 132.8	130	19.6	5.0	17.4 149.4	160	20.8	3.0	
1011002	14.5 139.4	140	14.4 139.2	130	13.0	-10.0	15.2 134.4	150	12.1	-10.0	14.1 133.2	155	14.8	25.0	17.0 140.0	160	20.0	3.0	
1011122	15.1 139.2	140	14.2 139.2	135	12.0	-5.0	16.1 137.4	150	5.0	-10.0	17.4 136.1	155	42.0	30.0	14.8 144.7	160	14.4	3.0	
1011182	15.7 138.0	150	15.8 138.0	135	6.0	-15.0	17.2 134.4	150	25.0	-5.0	14.8 134.8	155	11.9	30.0	20.3 143.6	160	10.1	3.0	
1012002	16.3 138.3	160	16.4 138.3	135	6.0	-25.0	18.4 134.1	140	11.0	-5.0	20.2 134.2	155	14.1	10.0	22.1 143.4	130	27.7	0.0	
1012062	16.8 137.7	165	16.9 137.4	145	8.0	-20.0	19.4 134.4	140	16.0	10.0	21.0 133.2	155	35.3	10.0	24.9 144.4	130	44.3	0.0	
1012122	16.9 137.2	165	17.1 137.2	155	12.0	-10.0	18.0 134.4	140	13.0	15.0	21.3 133.3	155	24.3	5.0	24.0 133.0	130	34.8	0.0	
1012182	16.8 136.9	155	17.3 136.7	155	32.0	0.0	18.7 134.0	145	11.0	10.0	20.7 133.6	155	21.1	0.0	23.0 132.8	120	30.6	0.0	
1013002	16.7 136.2	145	16.5 136.4	140	17.0	-5.0	16.9 137.5	140	20.0	0.0	18.4 136.0	150	20.2	-5.0	20.9 144.9	110	31.7	-10.0	
1013062	16.7 135.7	130	16.1 136.4	140	54.0	10.0	16.8 137.5	140	22.0	0.0	18.4 136.1	150	32.4	-5.0	20.9 144.9	110	34.1	0.0	
1013122	16.7 135.3	124	16.7 135.3	135	0.0	10.0	16.9 137.0	140	3.0	0.0	17.3 130.0	140	7.8	-5.0	14.0 147.1	110	17.2	0.0	
1013182	16.8 134.4	124	16.7 134.0	130	4.0	5.0	17.1 132.2	120	30.0	-5.0	17.4 129.3	120	41.0	0.0	14.0 146.6	110	14.4	0.0	
1014002	17.0 134.0	124	16.8 134.2	120	17.0	-5.0	17.3 131.7	110	60.0	-15.0	18.1 128.4	105	7.9	-15.0	10.1 146.2	100	17.9	0.0	
1014062	17.1 133.4	125	17.2 133.3	120	13.0	-5.0	18.0 130.4	100	20.0	-20.0	19.7 127.4	90	44.0	-20.0	20.5 144.3	80	21.0	-15.0	
1014122	17.3 132.5	125	17.1 132.4	120	13.0	-5.0	17.4 129.0	100	8.0	-20.0	18.4 125.5	100	21.5	-10.0	14.5 142.0	90	14.5	-5.0	
1014182	17.6 131.4	125	17.5 131.5	120	14.0	-5.0	18.3 124.1	100	8.0	-20.0	19.5 126.5	100	23.2	-5.0	21.0 141.0	90	40.6	0.0	
1015002	18.1 130.4	125	18.0 131.0	120	4.0	-5.0	19.3 124.3	100	45.0	-20.0	20.5 125.7	100	14.7	0.0	22.0 143.0	100	37.1	10.0	
1015062	18.4 130.4	125	18.5 130.0	115	23.0	-10.0	20.0 124.4	100	112.0	-10.0	21.5 124.5	100	14.6	0.0	24.0 143.0	95	37.7	10.0	
1015122	18.6 129.4	125	18.7 129.4	115	4.0	-10.0	20.0 127.2	100	8.0	-10.0	21.3 124.6	100	20.4	5.0	23.5 143.0	95	44.1	20.0	
1015182	18.9 129.5	120	19.0 129.0	110	23.0	-10.0	20.3 124.5	100	11.0	-5.0	21.4 124.0	95	23.8	5.0	24.3 143.0	90	54.0	15.0	
1016002	19.4 129.1	120	19.4 129.4	110	14.0	-10.0	21.4 127.4	100	1.0	0.0	21.4 126.4	95	12.2	5.0	24.4 145.7	90	41.8	20.0	
1016062	19.9 128.9	110	19.4 129.3	110	37.0	0.0	21.6 124.5	100	9.0	0.0	21.2 127.3	95	20.2	10.0	24.4 146.4	90	40.7	30.0	
1016122	20.5 128.4	110	20.6 128.7	105	4.0	-5.0	22.4 127.4	95	12.0	0.0	21.4 127.0	90	24.4	15.0	24.1 148.4	80	114.5	30.0	
1016182	20.8 128.4	105	21.1 128.4	100	19.0	-5.0	23.3 127.4	90	43.0	0.0	21.0 127.0	85	34.3	10.0	24.6 148.4	80	114.7	30.0	
1017002	21.5 128.1	100	21.5 128.2	95	6.0	-5.0	23.0 127.2	90	8.0	0.0	21.4 127.3	85	41.1	15.0	0.0	0.0	0.0	0.0	
1017062	22.4 127.9	95	22.0 127.4	95	29.0	0.0	24.4 127.0	85	14.0	0.0	21.7 127.8	80	74.6	20.0	0.0	0.0	0.0	0.0	
1017122	23.0 127.4	95	23.2 127.7	90	13.0	-5.0	26.0 127.1	75	20.0	0.0	20.4 129.1	85	104.9	15.0	0.0	0.0	0.0	0.0	
1017182	24.0 127.4	90	23.4 127.4	90	12.0	0.0	26.4 127.4	75	24.0	0.0	20.4 129.4	85	110.9	15.0	0.0	0.0	0.0	0.0	
1018002	25.1 127.4	90	25.1 127.4	85	0.0	-5.0	29.2 127.4	70	33.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
1018062	26.5 128.4	85	26.4 128.4	80	12.0	-5.0	31.7 131.4	55	43.1	-5.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
1018122	28.4 130.1	75	28.1 130.0	75	19.0	0.0	34.4 137.4	50	53.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
1018182	30.3 131.4	75	29.9 131.7	75	24.0	0.0	36.0 141.4	50	42.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
1019002	33.0 134.3	70	32.9 134.0	70	14.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
1019062	36.2 138.4	60																	

SUPER TYPHOON VERA

BEST TRACK				JANUARY				24 HOUR FORECAST				48 HOUR FORECAST				72 HOUR FORECAST			
MO/JA/HA	POSIT	WIND	DIR	POSIT	WIND	DIR	ERR	POSIT	WIND	DIR	ERR	POSIT	WIND	DIR	ERR	POSIT	WIND	DIR	ERR
1102007	7.0 145.4	25	8.5 145.4	20	32	-5	7.0 147.4	30	112	35	7.6 139.4	40	415	-95	8.3 146.4	50	470	-45	
1102067	7.6 144.7	55	7.3 145.4	50	54	-5	8.7 147.7	70	240	0	9.7 140.1	80	541	-60	10.9 147.0	85	722	-50	
1102127	7.2 143.6	50	7.6 144.4	55	81	-5	8.7 141.4	75	279	420	9.4 138.9	85	478	-55	11.2 145.9	95	712	-20	
1102107	7.6 142.2	50	7.3 143.4	55	94	-5	7.8 140.7	75	350	455	8.5 137.6	85	619	-50	9.1 144.4	95	722	0	
1103007	8.0 140.0	55	7.3 141.4	55	64	-10	8.6 134.1	75	222	460	10.2 130.3	85	298	-50	12.6 144.4	95	212	0	
1103067	8.6 139.0	70	4.3 139.0	55	14	-5	11.2 131.7	75	41	465	12.2 125.9	75	49	-60	17.6 142.3	75	78	-15	
1103127	9.2 147.1	65	9.2 137.0	70	4	-25	11.7 129.4	85	30	454	14.7 124.5	80	33	-35	14.7 142.6	75	104	-5	
1103107	10.0 145.1	130	9.4 134.2	55	13	-45	12.5 128.4	110	55	425	15.7 121.9	100	55	5	19.8 142.4	80	137	15	
1104007	10.5 143.0	135	10.5 133.4	125	23	-10	12.6 127.4	130	35	-5	15.3 123.9	120	70	25	19.0 142.2	110	91	70	
1104067	11.1 131.0	140	10.9 131.4	125	25	-15	13.0 124.0	130	24	-5	15.3 122.7	120	64	30	17.8 142.1	110	112	75	
1104127	11.6 129.2	140	11.4 129.1	130	13	-10	14.4 121.5	100	151	415	19.1 121.1	80	140	-20	21.0 148.0	50	470	20	
1104107	12.0 127.7	145	12.4 127.1	130	42	-5	15.7 120.7	100	170	5	19.6 121.8	80	120	15	0.0 0.0	0	-0	0	
1105007	12.7 125.0	135	12.7 125.4	125	5	-10	16.0 120.1	85	141	410	19.3 121.3	80	90	20	0.0 0.0	0	-0	0	
1105067	13.4 124.0	135	13.6 124.7	120	17	-15	16.3 120.4	80	109	410	19.6 122.3	80	142	25	0.0 0.0	0	-0	0	
1105127	14.3 124.1	115	14.2 124.1	120	6	5	17.5 124.4	100	34	20	20.7 126.0	70	508	40	0.0 0.0	0	-0	0	
1105107	14.8 123.4	45	15.0 123.1	120	25	25	18.4 124.4	100	114	54	0.0 0.0	0	-0	0	0.0 0.0	0	-0	0	
1106007	15.5 122.7	45	15.3 122.4	95	13	0	18.7 122.2	80	78	20	0.0 0.0	0	-0	0	0.0 0.0	0	-0	0	
1106067	16.3 122.3	90	16.4 122.5	90	13	0	19.4 124.4	70	205	35	0.0 0.0	0	-0	0	0.0 0.0	0	-0	0	
1106127	17.0 122.2	90	17.1 122.7	90	5	10	20.3 127.1	70	340	40	0.0 0.0	0	-0	0	0.0 0.0	0	-0	0	
1106107	17.8 121.7	45	17.9 121.0	95	15	40	0.0 0.0	0	-0	0	0.0 0.0	0	-0	0	0.0 0.0	0	-0	0	
1107007	17.8 121.2	40	18.3 121.7	80	41	20	0.0 0.0	0	-0	0	0.0 0.0	0	-0	0	0.0 0.0	0	-0	0	
1107067	18.3 120.2	35	19.2 121.4	35	105	0	0.0 0.0	0	-0	0	0.0 0.0	0	-0	0	0.0 0.0	0	-0	0	
1107127	17.0 117.0	30	19.2 121.4	25	257	-5	0.0 0.0	0	-0	0	0.0 0.0	0	-0	0	0.0 0.0	0	-0	0	

ALL FORECASTS

	MMNG	24-HR	48-HR	72-HR
AVG FORECAST POSIT ERROR	43	148	249	305
AVG LIGHT ANGLE ERROR	20	69	111	247
AVG INTENSITY MAGNITUDE ERROR	12	28	33	74
AVG INTENSITY BIAS	-3	-10	-14	7
NUMBER OF FORECASTS	23	19	15	11

TROPICAL STORM WAYNE

BEST TRACK				JANUARY				24 HOUR FORECAST				48 HOUR FORECAST				72 HOUR FORECAST			
MO/JA/HA	POSIT	WIND	DIR	POSIT	WIND	DIR	ERR	POSIT	WIND	DIR	ERR	POSIT	WIND	DIR	ERR	POSIT	WIND	DIR	ERR
1107007	9.9 141.4	15	0.0 0.0	0	-0	0	0.0 0.0	0	-0	0	0.0 0.0	0	-0	0	0.0 0.0	0	-0	0	0
1107007	12.4 141.0	15	0.0 0.0	0	-0	0	0.0 0.0	0	-0	0	0.0 0.0	0	-0	0	0.0 0.0	0	-0	0	0
1107127	14.4 139.0	15	0.0 0.0	0	-0	0	0.0 0.0	0	-0	0	0.0 0.0	0	-0	0	0.0 0.0	0	-0	0	0
1107107	14.8 137.7	20	0.0 0.0	0	-0	0	0.0 0.0	0	-0	0	0.0 0.0	0	-0	0	0.0 0.0	0	-0	0	0
1108007	15.0 135.7	20	0.0 0.0	0	-0	0	0.0 0.0	0	-0	0	0.0 0.0	0	-0	0	0.0 0.0	0	-0	0	0
1108007	15.4 133.4	25	15.3 134.4	25	52	0	18.1 130.1	50	139	10	21.4 130.3	55	235	5	24.8 144.9	45	404	10	0
1108127	16.4 132.1	30	16.3 132.1	30	13	0	19.4 127.4	65	232	20	21.0 126.4	65	221	15	24.5 148.4	40	335	15	0
1108107	16.0 130.4	30	17.1 130.4	30	64	0	19.4 124.4	45	250	0	21.5 124.1	55	321	5	24.8 145.4	35	341	10	0
1109007	15.8 129.0	35	15.0 129.0	35	53	0	18.0 124.1	45	290	-5	22.4 123.5	30	375	-10	0.0 0.0	0	-0	0	0
1109007	15.8 129.0	40	15.4 129.0	35	57	-5	16.3 124.4	25	272	-25	0.0 0.0	0	-0	0	0.0 0.0	0	-0	0	0
1109127	16.2 129.7	45	15.4 129.7	45	24	0	16.7 124.4	25	90	5	17.4 123.6	45	272	20	0.0 0.0	0	-0	0	0
1109107	16.9 129.1	45	16.4 129.7	50	33	5	17.4 124.2	60	49	10	19.5 129.5	50	187	25	23.0 143.3	30	450	0	0
1110007	17.5 129.0	50	17.7 129.1	50	21	0	21.2 129.4	80	174	20	24.7 134.9	45	469	20	0.0 0.0	0	-0	0	0
1110007	17.8 128.0	50	18.3 129.2	50	34	0	21.4 129.4	55	183	20	25.3 135.1	45	430	15	0.0 0.0	0	-0	0	0
1110127	18.0 128.7	50	19.6 128.3	50	42	0	20.4 124.4	55	139	30	23.4 127.2	40	351	10	0.0 0.0	0	-0	0	0
1110107	18.2 128.4	50	19.2 128.7	50	6	0	19.4 127.1	55	62	30	22.3 126.2	40	295	10	0.0 0.0	0	-0	0	0
1111007	18.6 128.4	40	19.7 128.4	40	6	0	20.4 124.4	35	162	10	23.4 128.9	30	477	5	0.0 0.0	0	-0	0	0
1111007	18.8 128.4	35	19.0 128.4	35	13	0	20.7 124.3	30	177	0	23.0 128.6	30	491	5	0.0 0.0	0	-0	0	0
1111127	18.9 128.2	25	19.4 128.4	25	14	0	0.0 0.0	0	-0	0	0.0 0.0	0	-0	0	0.0 0.0	0	-0	0	0
1111107	18.7 127.4	25	19.4 128.4	25	40	0	0.0 0.0	0	-0	0	0.0 0.0	0	-0	0	0.0 0.0	0	-0	0	0
1112007	18.3 127.1	25	0.0 0.0	0	-0	0	0.0 0.0	0	-0	0	0.0 0.0	0	-0	0	0.0 0.0	0	-0	0	0
1112007	18.1 126.8	30	19.1 126.8	30	0	0	17.4 124.2	35	110	10	0.0 0.0	0	-0	0	0.0 0.0	0	-0	0	0
1112127	17.8 126.2	30	19.0 126.4	30	21	0	17.3 124.4	35	163	10	0.0 0.0	0	-0	0	0.0 0.0	0	-0	0	0
1112107	17.4 125.4	30	17.9 126.2	30	50	0	17.4 124.4	30	223	10	0.0 0.0	0	-0	0	0.0 0.0	0	-0	0	0
1113007	16.9 124.4	25	17.2 125.4	25	21	0	0.0 0.0	0	-0	0	0.0 0.0	0	-0	0	0.0 0.0	0	-0	0	0
1113007	16.7 123.7	25	16.6 123.8	25	25	0	0.0 0.0	0	-0	0	0.0 0.0	0	-0	0	0.0 0.0	0	-0	0	0
1113127	15.7 122.4	25	15.7 122.4	25	0	0	0.0 0.0	0	-0	0	0.0 0.0	0	-0	0	0.0 0.0	0	-0	0	0
1113107	15.2 121.4	20	15.2 121.4	20	6	0	0.0 0.0	0	-0	0	0.0 0.0	0	-0	0	0.0 0.0	0	-0	0	0

ALL FORECASTS

	MMNG	24-HR	48-HR	72-HR
AVG FORECAST POSIT ERROR	27	170	362	443
AVG LIGHT ANGLE ERROR	14	115	295	413
AVG INTENSITY MAGNITUDE ERROR	0	13	12	0
AVG INTENSITY BIAS	0	10	10	0
NUMBER OF FORECASTS	25	16	12	4

## TROPICAL DEPRESSION 26

BEST TRACK				JANUARY				24 HOUR FORECAST				48 HOUR FORECAST				72 HOUR FORECAST			
MO/DA/HY	POSIT	WIND		POSIT	WIND	DIR	DIR	POSIT	WIND	DIR	DIR	POSIT	WIND	DIR	DIR	POSIT	WIND	DIR	DIR
1129187	12.2 154.5	15		0.0 0.0	0.0	0.0	0.0	0.0 0.0	0.0	0.0	0.0	0.0 0.0	0.0	0.0	0.0	0.0 0.0	0.0	0.0	0.0
1130007	13.6 154.6	15		0.0 0.0	0.0	0.0	0.0	0.0 0.0	0.0	0.0	0.0	0.0 0.0	0.0	0.0	0.0	0.0 0.0	0.0	0.0	0.0
1130067	14.9 154.6	15		0.0 0.0	0.0	0.0	0.0	0.0 0.0	0.0	0.0	0.0	0.0 0.0	0.0	0.0	0.0	0.0 0.0	0.0	0.0	0.0
1130122	16.2 154.2	20		0.0 0.0	0.0	0.0	0.0	0.0 0.0	0.0	0.0	0.0	0.0 0.0	0.0	0.0	0.0	0.0 0.0	0.0	0.0	0.0
1130182	17.4 153.3	25		0.0 0.0	0.0	0.0	0.0	0.0 0.0	0.0	0.0	0.0	0.0 0.0	0.0	0.0	0.0	0.0 0.0	0.0	0.0	0.0
1201007	18.5 152.3	25		14.7 152.2	25	13.0	0.0	24.5 144.7	10	13.0	0.0	0.0 0.0	0.0	0.0	0.0	0.0 0.0	0.0	0.0	0.0
1201067	19.7 151.6	30		13.6 151.6	30	6.0	0.0	25.0 150.0	30	6.0	0.0	0.0 0.0	0.0	0.0	0.0	0.0 0.0	0.0	0.0	0.0
1201122	20.9 150.7	30		20.2 151.3	30	33.0	0.0	26.0 151.7	30	80.0	15.0	0.0 0.0	0.0	0.0	0.0	0.0 0.0	0.0	0.0	0.0
1201182	22.5 150.0	30		22.2 150.5	30	31.0	0.0	0.0 0.0	0.0	0.0	0.0	0.0 0.0	0.0	0.0	0.0	0.0 0.0	0.0	0.0	0.0
1202007	24.2 149.8	30		24.5 150.0	30	21.0	0.0	0.0 0.0	0.0	0.0	0.0	0.0 0.0	0.0	0.0	0.0	0.0 0.0	0.0	0.0	0.0
1202067	26.7 150.6	30		25.6 150.4	30	14.0	0.0	0.0 0.0	0.0	0.0	0.0	0.0 0.0	0.0	0.0	0.0	0.0 0.0	0.0	0.0	0.0
1202122	28.2 152.1	15		0.0 0.0	0.0	0.0	0.0	0.0 0.0	0.0	0.0	0.0	0.0 0.0	0.0	0.0	0.0	0.0 0.0	0.0	0.0	0.0

ALL FORECASTS				
	4MM7	24-42	48-42	72-42
AVG FORECAST POSIT ERROR	21.	55.	0.	0.
AVG HIGH ANGLE ERROR	16.	28.	0.	0.
AVG INTENSITY MAGNITUDE ERROR	0.	5.	0.	0.
AVG INTENSITY HTAS	0.	5.	0.	0.
NUMBER OF FORECASTS	6	3	0	1

## TYPHOON ABBY

BEST TRACK				JANUARY				24 HOUR FORECAST				48 HOUR FORECAST				72 HOUR FORECAST			
MO/DA/HO	POSIT	WIND		POSIT	WIND		POSIT	WIND	POSIT	WIND	POSIT	WIND	POSIT	WIND	POSIT	WIND			
1129002	6.5 149.0	15	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
1129067	6.0 148.3	15	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
1129122	6.0 147.7	15	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
1129187	6.7 146.9	15	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
1130002	6.7 146.3	15	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
1130067	6.6 145.4	20	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
1130122	6.5 144.9	20	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
1130187	6.3 144.2	20	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
1201002	6.2 143.4	20	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
1201067	5.9 142.4	25	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
1201122	5.8 141.0	25	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
1201187	5.7 140.0	30	5.7	151.1	25	22.0	0.0	6.4	150.1	30	77.0	0.0	7.0	150.0	35	24.0			
1202007	5.6 140.3	40	5.7	150.1	35	13.0	0.0	7.0	150.0	45	18.0	0.0	0.1	151.6	50	40.0			
1202067	5.5 139.4	40	5.0	150.1	35	42.0	0.0	7.5	150.0	50	36.0	10.0	0.0	150.6	55	40.0			
1202122	6.0 139.6	45	5.3	150.1	35	30.0	-10.0	6.7	150.4	50	14.0	10.0	0.1	153.6	60	15.0			
1202187	6.1 149.3	45	5.0	150.0	35	24.0	-10.0	6.0	150.2	50	15.0	10.0	0.0	152.7	60	14.0			
1203007	6.4 149.1	45	5.3	150.0	35	5.0	10.0	7.0	157.4	55	7.0	20.0	0.0	154.8	60	30.0			
1203067	6.5 149.0	40	5.3	150.0	30	12.0	20.0	6.7	150.1	75	9.0	20.0	0.0	155.3	90	46.0			
1203122	6.8 148.0	40	5.6	150.0	45	25.0	0.0	7.0	157.4	65	3.0	0.0	0.0	154.9	90	106.0			
1203187	7.3 148.4	40	6.7	150.4	45	34.0	0.0	8.0	157.1	60	7.0	0.0	0.0	154.2	75	114.0			
1204007	8.1 148.1	45	8.1	150.5	35	12.0	10.0	10.0	155.1	65	108.0	0.0	11.3	150.8	75	143.0			
1204067	8.2 147.4	45	8.0	157.7	35	40.0	0.0	10.0	153.3	65	170.0	0.0	11.0	148.7	75	210.0			
1204122	8.2 146.6	40	8.2	156.1	35	14.0	0.0	9.0	151.5	65	150.0	0.0	11.6	147.1	75	202.0			
1204182	8.2 145.8	40	8.1	154.0	60	52.0	0.0	9.0	150.4	70	161.0	20.0	11.4	145.8	95	140.0			
1205007	8.2 145.1	40	8.0	153.8	60	79.0	0.0	10.0	149.2	70	173.0	35.0	11.0	144.8	95	153.0			
1205067	8.1 144.2	40	8.3	150.4	60	17.0	0.0	9.4	150.7	70	23.0	0.0	11.2	146.2	95	42.0			
1205122	8.0 143.3	40	7.9	153.2	60	13.0	0.0	8.7	149.4	70	53.0	40.0	10.0	145.0	95	21.0			
1205187	8.3 142.5	40	7.8	152.0	55	42.0	0.0	9.2	147.4	65	40.0	35.0	10.0	143.8	95	40.0			
1206007	9.4 141.3	35	9.3	151.4	55	42.0	20.0	9.2	147.4	60	71.0	30.0	10.0	143.4	95	43.0			
1206067	9.2 141.0	40	9.3	150.9	55	14.0	25.0	10.0	147.2	50	77.0	15.0	10.0	142.9	90	75.0			
1206122	9.5 140.8	40	9.4	150.1	55	30.0	25.0	11.0	147.0	50	103.0	15.0	11.0	142.9	95	63.0			
1206187	9.8 140.1	30	9.7	149.1	50	54.0	20.0	11.3	146.4	50	19.0	15.0	12.3	141.0	95	39.0			
1207007	10.0 140.7	30	10.1	149.5	50	71.0	20.0	11.0	138.1	40	68.0	0.0	15.1	132.4	30	47.0			
1207067	10.2 145.9	45	10.2	143.2	50	159.0	15.0	12.0	138.5	40	50.0	10.0	15.0	132.3	30	38.0			
1207122	10.6 145.3	45	10.4	141.0	50	134.0	15.0	12.0	137.4	45	283.0	15.0	15.7	133.3	30	35.0			
1207182	11.0 144.4	45	11.0	140.0	45	12.0	10.0	12.0	140.4	40	135.0	10.0	17.0	141.0	30	30.0			
1208007	11.7 144.1	35	11.4	144.5	40	29.0	0.0	13.5	142.3	35	235.0	0.0	16.7	140.3	20	30.0			
1208067	12.1 143.4	30	11.5	143.0	35	37.0	0.0	14.3	141.4	30	314.0	0.0	0.0	0.0	0.0	0.0			
1208122	12.2 142.1	30	12.2	142.1	35	0.0	0.0	15.2	124.1	20	243.0	0.0	0.0	0.0	0.0	0.0			
1208187	11.4 140.4	15	12.5	140.0	35	45.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
1209007	11.4 138.0	35	11.4	139.3	30	23.0	0.0	11.0	134.4	25	10.0	20.0	10.0	127.2	20	280.0			
1209067	11.0 137.4	45	11.3	137.8	30	30.0	0.0	10.0	131.7	15	85.0	20.0	10.0	125.7	30	147.0			
1209122	10.3 136.0	40	10.6	135.1	45	53.0	0.0	10.0	129.1	40	223.0	10.0	10.1	123.6	30	47.0			
1209187	10.5 134.7	45	10.0	133.7	45	64.0	0.0	9.0	127.7	40	244.0	10.0	0.0	0.0	0.0	0.0			
1210007	11.3 133.3	30	11.4	133.8	60	22.0	10.0	12.0	124.7	70	129.0	10.0	14.0	121.6	75	61.0			
1210067	11.7 132.3	40	11.7	132.4	60	29.0	0.0	13.2	127.5	75	160.0	10.0	14.2	122.2	55	37.0			
1211122	12.3 132.1	70	12.1	132.2	60	13.0	-10.0	13.7	124.4	75	108.0	10.0	14.2	124.0	55	37.0			
1211187	13.1 131.7	75	12.4	131.4	60	21.0	-15.0	14.4	124.1	75	148.0	20.0	14.6	124.9	75	43.0			
1211007	13.7 130.4	80	13.7	130.7	40	6.0	0.0	16.0	127.4	60	170.0	0.0	16.0	122.4	60	71.0			
1211067	14.2 130.1	85	14.2	130.0	40	0.0	0.0	16.0	126.8	60	242.0	0.0	16.0	122.7	60	74.0			
1211122	14.0 130.1	90	14.7	129.7	40	22.0	-10.0	16.7	127.3	60	270.0	0.0	16.7	123.3	60	47.0			
1211187	15.7 130.2	95	16.3	130.2	70	0.0	0.0	20.3	132.0	70	320.0	0.0	20.0	134.3	90	13.0			
1212007	16.6 130.0	100	16.3	130.2	40	4.0	-10.0	20.0	132.0	60	124.0	0.0	20.0	141.6	95	15.0			

121200Z	17.1	141.0	100	17.4	130.0	100	13	0	21.0	134.1	00	130	050	24.0	147.0	30	276	-5	0.0	0.0	0	-0	0
121212Z	18.0	132.0	100	17.9	131.0	95	13	-5	21.4	134.1	00	130	030	0.0	0.0	0	-0	0	0.0	0.0	0	-0	0
121218Z	18.0	133.1	100	18.0	133.2	85	4	-15	23.0	140.1	45	70	030	0.0	0.0	0	-0	0	0.0	0.0	0	-0	0
121300Z	19.8	136.5	110	20.0	136.0	85	25	-25	24.0	147.4	45	130	015	0.0	0.0	0	-0	0	0.0	0.0	0	-0	0
121306Z	20.5	136.2	110	21.1	136.0	80	53	-30	25.0	144.4	35	261	-4	0.0	0.0	0	-0	0	0.0	0.0	0	-0	0
121312Z	21.2	138.1	00	21.4	138.2	100	13	10	24.7	147.2	55	123	24	0.0	0.0	0	-0	0	0.0	0.0	0	-0	0
121318Z	21.8	140.1	00	22.0	140.2	85	13	5	25.4	150.4	45	160	15	0.0	0.0	0	-0	0	0.0	0.0	0	-0	0
121400Z	22.2	142.4	00	22.3	142.4	70	13	10	0.0	0.0	0	-0	0	0.0	0.0	0	-0	0	0.0	0.0	0	-0	0
121406Z	22.6	144.9	00	22.5	145.0	60	4	20	0.0	0.0	0	-0	0	0.0	0.0	0	-0	0	0.0	0.0	0	-0	0
121412Z	22.7	147.2	30	22.8	147.4	00	8	10	0.0	0.0	0	-0	0	0.0	0.0	0	-0	0	0.0	0.0	0	-0	0
121418Z	22.8	150.3	30	0.0	0.0	0	-0	0	0.0	0.0	0	-0	0	0.0	0.0	0	-0	0	0.0	0.0	0	-0	0
121500Z	23.0	153.0	25	0.0	0.0	0	-0	0	0.0	0.0	0	-0	0	0.0	0.0	0	-0	0	0.0	0.0	0	-0	0

ALL FORECASTS

	24-HR	48-HR	72-HR	
AVG FORECAST POSIT ERROR	31	164	285	378
AVG RIGHT ANGLE ERROR	17	108	198	215
AVG INTENSITY MAGNITUDE ERROR	10	20	30	47
AVG INTENSITY BIAS	2	-2	-1	22
NUMBER OF FORECASTS	52	48	39	25

# TROPICAL STORM BEN

BEST TRACK			WINDING			24 HOUR FORECAST				48 HOUR FORECAST				72 HOUR FORECAST				
MO/DAY/HR	POSIT	WIND	POSIT	WIND	POSIT	WIND	POSIT	WIND	POSIT	WIND	POSIT	WIND	POSIT	WIND	POSIT	WIND		
121700Z	7.0	149.0	15	0.0	0.0	0	-0	0	0.0	0.0	0	-0	0	0.0	0.0	0	-0	0
121706Z	7.3	148.0	15	0.0	0.0	0	-0	0	0.0	0.0	0	-0	0	0.0	0.0	0	-0	0
121712Z	7.5	147.0	15	0.0	0.0	0	-0	0	0.0	0.0	0	-0	0	0.0	0.0	0	-0	0
121718Z	7.7	146.0	15	0.0	0.0	0	-0	0	0.0	0.0	0	-0	0	0.0	0.0	0	-0	0
121800Z	8.0	145.0	15	0.0	0.0	0	-0	0	0.0	0.0	0	-0	0	0.0	0.0	0	-0	0
121806Z	8.2	143.0	15	0.0	0.0	0	-0	0	0.0	0.0	0	-0	0	0.0	0.0	0	-0	0
121812Z	8.5	142.7	15	0.0	0.0	0	-0	0	0.0	0.0	0	-0	0	0.0	0.0	0	-0	0
121818Z	8.7	141.6	15	0.0	0.0	0	-0	0	0.0	0.0	0	-0	0	0.0	0.0	0	-0	0
121900Z	9.0	140.0	15	0.0	0.0	0	-0	0	0.0	0.0	0	-0	0	0.0	0.0	0	-0	0
121906Z	9.4	138.4	15	0.0	0.0	0	-0	0	0.0	0.0	0	-0	0	0.0	0.0	0	-0	0
121912Z	9.9	137.0	15	0.0	0.0	0	-0	0	0.0	0.0	0	-0	0	0.0	0.0	0	-0	0
121918Z	10.4	135.5	15	0.0	0.0	0	-0	0	0.0	0.0	0	-0	0	0.0	0.0	0	-0	0
122000Z	10.9	134.0	20	0.0	0.0	0	-0	0	0.0	0.0	0	-0	0	0.0	0.0	0	-0	0
122006Z	11.3	132.5	20	0.0	0.0	0	-0	0	0.0	0.0	0	-0	0	0.0	0.0	0	-0	0
122012Z	11.6	130.0	25	0.0	0.0	0	-0	0	0.0	0.0	0	-0	0	0.0	0.0	0	-0	0
122018Z	11.6	129.2	30	0.0	0.0	0	-0	0	0.0	0.0	0	-0	0	0.0	0.0	0	-0	0
122100Z	11.5	127.4	40	0.0	0.0	0	-0	0	0.0	0.0	0	-0	0	0.0	0.0	0	-0	0
122106Z	11.4	126.0	50	11.5	125.0	50	8	0	12.0	122.1	35	93	015	14.7	119.3	35	109	0
122112Z	11.8	124.3	40	11.6	124.4	45	21	5	13.0	121.2	35	115	020	15.1	118.8	35	115	10
122118Z	12.2	123.0	40	11.8	122.7	40	30	0	13.7	118.0	35	80	025	0.0	0.0	0	-0	0
122200Z	12.7	121.4	45	12.7	121.0	50	6	5	14.7	117.7	40	130	015	0.0	0.0	0	-0	0
122206Z	13.0	120.5	50	13.0	120.4	40	6	-10	15.4	116.4	35	281	0	0.0	0.0	0	-0	0
122212Z	13.8	119.4	55	13.7	119.0	50	24	-5	17.7	117.0	35	380	10	0.0	0.0	0	-0	0
122218Z	14.6	119.2	60	14.3	118.2	50	61	-10	0.0	0.0	0	-0	0	0.0	0.0	0	-0	0
122300Z	15.6	119.5	55	15.6	119.4	55	6	0	0.0	0.0	0	-0	0	0.0	0.0	0	-0	0
122306Z	17.6	121.0	35	16.9	119.0	45	75	10	0.0	0.0	0	-0	0	0.0	0.0	0	-0	0
122312Z	19.6	123.4	25	18.4	122.1	25	103	0	0.0	0.0	0	-0	0	0.0	0.0	0	-0	0

ALL FORECASTS

	24-HR	48-HR	72-HR	
AVG FORECAST POSIT ERROR	34	181	287	0
AVG RIGHT ANGLE ERROR	18	89	15	0
AVG INTENSITY MAGNITUDE ERROR	5	14	5	0
AVG INTENSITY BIAS	-1	-11	5	0
NUMBER OF FORECASTS	10	6	2	0

## 2. NORTH INDIAN OCEAN CYCLONE TRACK DATA

TC 17-79

NO/DA/HR	BEST TRACK				WARNING				24 HOUR FORECAST				48 HOUR FORECAST				72 HOUR FORECAST			
	POSIT	WIND	POSIT	WIND	POSIT	WIND	POSIT	WIND	POSIT	WIND	POSIT	WIND	POSIT	WIND	POSIT	WIND	POSIT	WIND		
050508Z	6.3	00.0	14	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
050514Z	6.4	00.0	20	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
050520Z	6.5	00.0	20	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
050602Z	6.6	00.0	25	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
050608Z	7.0	00.0	25	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
050614Z	7.5	00.0	30	7.7	07.7	30	45	0	8.7	08.7	35	120	10.1	04.5	45	243	-15	12.0		
050620Z	7.6	00.0	30	7.4	07.5	30	32	0	8.8	08.5	35	140	10.8	04.1	45	253	-15	12.7		
050702Z	7.1	07.7	35	7.9	08.0	35	49	0	9.4	08.7	45	262	11.2	08.7	55	257	-10	13.3		
050708Z	6.7	07.7	35	7.2	07.7	35	42	0	8.7	07.4	45	179	10.5	08.2	55	185	-10	12.6		
050714Z	6.7	06.4	40	7.6	07.1	40	61	0	9.9	07.0	50	222	10.7	09.0	65	247	5	14.0		
050720Z	6.4	06.1	45	7.5	06.4	45	72	0	9.4	06.4	60	140	11.6	08.7	70	113	10	13.0		
050802Z	5.8	06.0	50	6.9	06.0	50	66	0	7.4	06.7	60	189	11.5	08.0	55	315	-10	9.4		
050808Z	5.9	06.4	60	5.8	06.0	60	30	0	4.9	06.4	65	258	11.4	08.2	70	470	0	5.3		
050814Z	6.5	06.4	60	5.2	05.4	60	98	0	4.9	06.4	65	330	11.4	07.2	70	511	-5	5.5		
050820Z	7.1	06.4	60	5.9	06.7	60	73	0	5.7	06.1	65	275	11.4	04.0	70	439	-5	5.4		
050902Z	7.6	06.3	65	7.3	06.7	65	19	0	8.2	06.7	70	181	11.4	01.5	65	249	-10	9.4		
050908Z	8.2	06.1	65	7.4	05.4	65	30	0	9.0	06.1	70	161	11.3	01.5	65	191	-15	11.0		
050914Z	9.2	05.0	60	8.8	05.4	60	30	0	10.4	06.5	55	114	11.9	01.2	50	111	-35	12.7		
050920Z	10.3	05.3	60	10.4	05.7	60	8	0	12.7	07.7	60	42	11.0	00.0	55	70	-30	13.3		
051002Z	11.2	04.4	65	10.9	04.3	65	25	0	12.3	07.1	60	67	11.0	00.0	101	-20	11.0	0.0		
051008Z	11.7	04.7	70	11.6	03.9	75	19	5	12.5	07.4	65	75	11.1	00.0	112	-25	11.0	0.0		
051014Z	12.3	03.7	75	12.1	03.4	75	21	0	13.7	07.7	65	42	11.0	00.0	120	-10	11.0	0.0		
051020Z	12.7	03.7	75	12.7	03.4	75	12	0	13.7	07.1	65	33	11.0	00.0	120	0	11.0	0.0		
051102Z	13.0	02.7	75	13.1	02.4	80	5	5	14.1	06.0	65	25	11.0	0.0	0	-0	0	0.0		
051108Z	13.4	02.3	80	13.2	02.1	90	12	10	14.7	06.5	105	64	11.0	0.0	0	-0	0	0.0		
051114Z	13.7	01.7	85	14.2	00.0	95	55	10	16.5	07.2	30	70	11.0	0.0	0	-0	0	0.0		
051120Z	14.1	01.7	85	14.1	00.4	95	23	10	16.0	07.4	30	64	11.0	0.0	0	-0	0	0.0		
051202Z	14.5	00.4	90	14.4	00.5	90	18	10	0.0	0.0	0	-0	11.0	0.0	0	-0	0	0.0		
051208Z	15.2	00.1	90	14.8	00.5	85	33	5	0.0	0.0	0	-0	11.0	0.0	0	-0	0	0.0		
051214Z	16.0	00.7	60	15.2	00.0	60	59	0	0.0	0.0	0	-0	11.0	0.0	0	-0	0	0.0		
051220Z	17.0	00.1	50	17.0	00.1	50	0	0	0.0	0.0	0	-0	11.0	0.0	0	-0	0	0.0		

	A/L FORECASTS			
	WMNG	24-HR	48-HR	72-HR
AVG FORECAST POSIT ERROR	76.	139.	233.	344.
AVG RIGHT ANGLE ERROR	17.	95.	192.	206.
AVG INTENSITY MAGNITUDE ERROR	2.	9.	13.	12.
AVG INTENSITY BIAS	2.	-5.	-11.	-12.
NUMBER OF FORECASTS	24	22	18	14

TC 18-79

NO/DA/HR	BEST TRACK				WARNING				24 HOUR FORECAST				48 HOUR FORECAST				72 HOUR FORECAST			
	POSIT	WIND	POSIT	WIND	POSIT	WIND	POSIT	WIND	POSIT	WIND	POSIT	WIND	POSIT	WIND	POSIT	WIND	POSIT	WIND	POSIT	WIND
061714Z	17.7	06.4	25	0.0	0.0	0.	-0	0.	0.0	0.0	0.	-0	0.	0.0	0.0	0.	-0	0.	0.0	0.0
061720Z	17.9	05.5	30	0.0	0.0	0.	-0	0.	0.0	0.0	0.	-0	0.	0.0	0.0	0.	-0	0.	0.0	0.0
061802Z	18.0	04.4	30	18.3	05.3	40	34	10	19.5	04.4	50	238	21.5	05.0	60	426	20	11.0	0.0	0
061808Z	18.0	04.0	35	18.4	04.0	40	56	5	19.4	04.1	55	240	22.0	04.0	60	442	35	11.0	0.0	0
061814Z	18.2	03.1	40	18.2	03.4	45	40	5	19.4	02.7	55	170	22.4	03.5	60	445	40	11.0	0.0	0
061820Z	18.2	01.8	45	18.5	02.4	45	38	0	19.7	02.1	55	40	21.8	02.5	40	100	25	11.0	0.0	0
061902Z	18.0	00.7	50	18.7	01.7	50	70	0	20.0	00.4	50	60	11.0	0.0	0	-0	0	11.0	0.0	0
061908Z	18.4	00.0	50	18.7	00.0	50	14	0	20.7	00.1	40	77	11.0	0.0	0	-0	0	11.0	0.0	0
061914Z	18.8	00.4	50	18.5	00.4	50	50	0	20.2	00.1	25	115	11.0	0.0	0	-0	0	11.0	0.0	0
061920Z	19.1	00.4	50	19.0	00.7	50	29	0	0.0	0.0	0.	-0	11.0	0.0	0	-0	0	11.0	0.0	0
062002Z	19.2	00.4	40	19.4	00.0	40	10	0	0.0	0.0	0.	-0	11.0	0.0	0	-0	0	11.0	0.0	0
062008Z	19.5	00.4	25	19.8	00.7	45	92	20	0.0	0.0	0.	-0	11.0	0.0	0	-0	0	11.0	0.0	0
062014Z	19.8	00.1	20	20.0	00.4	35	41	15	0.0	0.0	0.	-0	11.0	0.0	0	-0	0	11.0	0.0	0
062020Z	20.1	00.7	14	20.5	00.4	25	25	10	0.0	0.0	0.	-0	11.0	0.0	0	-0	0	11.0	0.0	0

	A/L FORECASTS			
	WMNG	24-HR	48-HR	72-HR
AVG FORECAST POSIT ERROR	48.	137.	163.	0.
AVG RIGHT ANGLE ERROR	24.	78.	284.	0.
AVG INTENSITY MAGNITUDE ERROR	6.	5.	30.	0.
AVG INTENSITY BIAS	6.	5.	30.	0.
NUMBER OF FORECASTS	12	7	4	0

TC 22-79

BEST TRACK				WARNING				24 HOUR FORECAST				48 HOUR FORECAST				72 HOUR FORECAST			
MO/DA/HO	POSIT	WIND	WAVE	POSIT	WIND	WAVE	WIND	POSIT	WIND	WAVE	WIND	POSIT	WIND	WAVE	WIND	POSIT	WIND	WAVE	WIND
092002Z	9.1	47.0	20	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
092008Z	9.7	47.4	20	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
092014Z	10.1	46.4	20	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
092020Z	10.4	46.4	20	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
092102Z	10.7	46.0	20	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
092108Z	11.1	45.4	24	11.0	85.4	25	9.0	12.4	83.4	35	140	10	14.2	80.9	40	137	30	0.0	0.0
092114Z	11.6	45.2	24	11.0	84.0	25	79.0	12.2	82.4	35	191	10	13.1	80.5	40	209	30	0.0	0.0
092120Z	12.0	45.0	24	12.1	84.0	25	62.0	13.4	83.0	35	130	10	14.6	80.9	40	145	30	0.0	0.0
092202Z	14.0	44.7	24	12.5	84.4	30	91.0	13.7	87.4	35	140	10	0.0	0.0	0.0	0.0	0.0	0.0	0.0
092208Z	14.4	43.0	24	13.5	82.4	30	105.0	14.4	81.1	40	121	30	0.0	0.0	0.0	0.0	0.0	0.0	0.0
092214Z	15.3	43.1	24	13.0	84.0	30	55.0	16.7	81.4	40	64	30	0.0	0.0	0.0	0.0	0.0	0.0	0.0
092220Z	15.5	42.2	20	13.4	83.0	30	46.0	18.0	80.2	10	50	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
092302Z	15.9	41.4	20	16.0	82.2	30	46.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
092308Z	16.5	40.4	10	16.5	81.4	25	34.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
092314Z	16.6	40.4	10	17.0	80.4	15	29.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
092320Z	17.1	40.3	10	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

ALL FORECASTS  
 WIND 24-HR 48-HR 72-HR  
 AVG FORECAST POSIT ERROR 54. 122. 170. 0.  
 AVG RIGHT ANGLE ERROR 34. 90. 122. 0.  
 AVG INTENSITY MAGNITUDE ERROR 6. 16. 30. 0.  
 AVG INTENSITY RIAS 6. 16. 30. 0.  
 NUMBER OF FORECASTS 10 7 3 0

TC 23-79

BEST TRACK				WARNING				24 HOUR FORECAST				48 HOUR FORECAST				72 HOUR FORECAST			
MO/DA/HO	POSIT	WIND	WAVE	POSIT	WIND	WAVE	WIND	POSIT	WIND	WAVE	WIND	POSIT	WIND	WAVE	WIND	POSIT	WIND	WAVE	WIND
091802Z	12.2	72.0	15	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
091808Z	12.5	71.4	15	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
091814Z	13.0	71.5	15	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
091820Z	13.4	71.4	15	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
091902Z	13.8	71.4	20	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
091908Z	14.3	71.3	20	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
091914Z	14.6	71.0	20	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
091920Z	15.0	70.4	20	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
092002Z	15.3	70.4	20	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
092008Z	15.6	70.2	24	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
092014Z	16.0	69.0	24	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
092020Z	16.4	69.4	24	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
092102Z	16.8	69.2	24	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
092108Z	17.4	68.8	24	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
092114Z	18.0	68.1	30	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
092120Z	18.4	67.2	34	19.2	68.0	30	97.0	20.1	64.4	40	294	10	22.0	68.6	45	449	5	24.0	19.0
092202Z	18.6	66.2	40	18.7	68.7	30	142.0	20.2	64.4	40	331	10	22.7	68.9	45	510	10	24.5	19.7
092208Z	19.0	65.3	44	19.2	65.7	40	26.0	20.2	63.4	45	80	0	20.4	61.6	45	119	15	0.0	0.0
092214Z	19.3	64.3	44	19.4	64.4	40	25.0	19.4	61.3	50	13	0	20.5	58.0	0	57	-30	0.0	0.0
092220Z	19.6	63.3	50	19.4	63.7	50	25.0	20.1	59.7	70	51	30	20.9	55.9	20	119	-5	0.0	0.0
092302Z	19.7	62.7	54	19.6	62.7	65	6.0	20.4	58.4	60	73	25	0.0	0.0	0.0	0.0	0.0	0.0	0.0
092308Z	19.9	62.0	50	19.4	61.7	65	14.0	20.7	57.4	65	107	35	0.0	0.0	0.0	0.0	0.0	0.0	0.0
092314Z	20.0	61.4	45	20.0	63.4	35	118.0	21.3	64.1	20	362	10	0.0	0.0	0.0	0.0	0.0	0.0	0.0
092320Z	20.2	60.4	40	20.3	60.3	35	18.0	22.1	57.7	20	126	-5	0.0	0.0	0.0	0.0	0.0	0.0	0.0
092402Z	20.3	60.1	35	20.5	59.4	35	33.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
092408Z	20.1	59.4	30	20.4	58.4	30	61.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
092414Z	19.9	58.4	30	20.3	58.4	25	37.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
092420Z	20.0	57.4	24	19.8	58.0	25	18.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
092502Z	20.0	56.4	20	20.0	57.4	15	45.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

ALL FORECASTS  
 WIND 24-HR 48-HR 72-HR  
 AVG FORECAST POSIT ERROR 48. 160. 253. 773.  
 AVG RIGHT ANGLE ERROR 21. 97. 186. 620.  
 AVG INTENSITY MAGNITUDE ERROR 4. 16. 13. 1.  
 AVG INTENSITY RIAS -1. 6. -1. -1.  
 NUMBER OF FORECASTS 14 9 5 2

TC 24-79

BEST TRACK				VARYING				24 HOUR FORECAST				48 HOUR FORECAST				72 HOUR FORECAST			
MO/DA/HR	POSIT	WIND	WST	WIND	DST WIND	POSIT	WIND	DST WIND	POSIT	WIND	DST WIND	POSIT	WIND	DST WIND	POSIT	WIND	DST WIND		
102902Z	11.1	90.4	20	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
102908Z	11.7	90.1	20	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
102914Z	12.2	89.4	20	12.5	89.4	20	21.0	0.0	16.7	89.4	40	25.0	15.0	91.9	30	43.0	-5.0		
102920Z	12.4	89.0	24	13.5	89.0	25	66.0	0.0	16.0	89.2	40	25.0	15.0	90.2	30	42.0	-5.0		
103002Z	12.4	88.2	24	13.6	88.2	25	77.0	0.0	15.4	87.4	35	19.0	5.0	87.5	40	40.0	10.0		
103008Z	12.0	87.1	24	12.6	88.2	25	65.0	0.0	13.2	84.7	30	16.0	0.0	84.0	35	30.5	15.0		
103014Z	13.1	86.2	24	12.5	87.0	25	105.0	0.0	12.0	84.4	30	21.0	-5.0	84.0	35	34.5	20.0		
103020Z	13.4	85.4	30	13.0	86.4	25	58.0	-5.0	14.0	83.4	35	12.0	0.0	0.0	0.0	0.0	0.0		
103102Z	13.5	84.0	30	13.4	84.4	25	30.0	-5.0	15.7	80.4	35	16.0	5.0	0.0	0.0	0.0	0.0		
103108Z	13.4	83.0	30	13.8	83.4	30	33.0	0.0	15.8	80.1	25	19.0	5.0	0.0	0.0	0.0	0.0		
103114Z	13.0	82.8	34	13.0	82.8	30	54.0	-5.0	15.1	79.3	20	14.0	5.0	0.0	0.0	0.0	0.0		
103120Z	12.7	81.0	34	13.8	82.4	30	72.0	-5.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
110102Z	12.5	80.0	30	12.7	81.0	30	13.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
110108Z	12.5	80.1	20	12.7	79.0	20	17.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
110114Z	12.7	79.3	14	12.7	79.4	15	17.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		

AFL FORECASTS			
WIND	24-HR	48-HR	72-HR
48.	190.	482.	1074.
26.	142.	332.	907.
2.	6.	11.	0.
-2.	4.	7.	0.
13	3	5	1

AVG FORECAST POSIT ERROR  
AVG RIGHT ANGLE ERROR  
AVG INTENSITY MAGNITUDE ERROR  
AVG INTENSITY BIAS  
NUMBER OF FORECASTS

TC 25-79

BEST TRACK				VARYING				24 HOUR FORECAST				48 HOUR FORECAST				72 HOUR FORECAST			
MO/DA/HR	POSIT	WIND		POSIT	WIND	DST	WIND	POSIT	WIND	DST	WIND	POSIT	WIND	DST	WIND	POSIT	WIND	DST	WIND
111402Z	12.3	70.1	20	0.0	0.0	0.0	-0.0	0.0	0.0	0.0	-0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
111408Z	12.8	70.0	20	0.0	0.0	0.0	-0.0	0.0	0.0	0.0	-0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
111414Z	13.0	69.0	20	0.0	0.0	0.0	-0.0	0.0	0.0	0.0	-0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
111420Z	13.3	69.4	20	0.0	0.0	0.0	-0.0	0.0	0.0	0.0	-0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
111502Z	13.6	69.4	20	0.0	0.0	0.0	-0.0	0.0	0.0	0.0	-0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
111508Z	13.9	69.4	25	0.0	0.0	0.0	-0.0	0.0	0.0	0.0	-0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
111514Z	14.2	69.4	30	0.0	0.0	0.0	-0.0	0.0	0.0	0.0	-0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
111520Z	14.6	69.4	30	0.0	0.0	0.0	-0.0	0.0	0.0	0.0	-0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
111602Z	15.0	69.0	34	15.0	70.0	40	6.0	5.0	17.0	70.3	45	7.0	5.0	10.5	71.4	60	121.0	45.0	0.0
111608Z	15.6	70.0	40	14.6	69.7	40	62.0	0.0	15.4	69.0	45	191.0	10.0	0.0	0.0	0.0	0.0	0.0	0.0
111614Z	16.4	70.2	40	14.6	69.7	40	111.0	0.0	15.4	69.0	45	239.0	15.0	0.0	0.0	0.0	0.0	0.0	0.0
111620Z	17.3	70.4	40	17.3	70.4	40	23.0	0.0	20.2	74.7	0.0	25.0	22.0	0.0	0.0	0.0	0.0	0.0	0.0
111702Z	18.2	70.2	40	18.1	71.4	40	74.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
111708Z	18.8	70.1	34	17.9	71.0	35	115.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
111714Z	19.6	70.1	30	19.7	70.1	30	6.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
111720Z	20.3	70.2	24	20.3	70.2	25	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
111802Z	21.3	70.4	14	0.0	0.0	0.0	-0.0	0.0	0.0	0.0	-0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

AFL FORECASTS			
WIND	24-HR	48-HR	72-HR
50.	189.	121.	0.
26.	103.	73.	0.
1.	14.	45.	0.
1.	1.	45.	0.
4	4	1	0

AVG FORECAST POSIT ERROR  
AVG RIGHT ANGLE ERROR  
AVG INTENSITY MAGNITUDE ERROR  
AVG INTENSITY BIAS  
NUMBER OF FORECASTS

TC 26-79

BEST TRACK				WARNING ERRORS				24 HOUR FORECAST ERRORS				48 HOUR FORECAST ERRORS				72 HOUR FORECAST ERRORS			
MO/DA/HA	POSIT	WIND		POSIT	WIND	DST	WIND	POSIT	WIND	DST	WIND	POSIT	WIND	DST	WIND	POSIT	WIND	DST	WIND
112014Z	8.0	94.2	14	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
112020Z	8.0	93.4	14	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
112102Z	9.7	92.4	14	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
112108Z	10.4	92.4	20	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
112114Z	10.7	91.4	20	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
112120Z	10.8	91.7	20	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
112202Z	10.9	91.4	20	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
112208Z	10.8	90.4	20	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
112214Z	10.7	90.0	20	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
112220Z	10.5	88.7	20	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
112302Z	10.4	87.4	20	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
112308Z	10.6	86.5	25	10.0	88.0	25	95	0	10.7	84.4	30	170	0	11.4	81.8	35	162	10	0.0
112314Z	10.7	85.4	25	10.3	87.1	30	103	5	11.7	84.0	35	150	5	12.0	80.9	35	145	20	0.0
112320Z	10.7	84.3	30	10.6	84.0	35	19	5	11.8	80.4	45	30	20	0.0	0.0	0.0	0.0	0.0	0.0
112402Z	10.6	83.0	30	11.0	82.5	35	38	5	12.7	74.4	25	124	0	0.0	0.0	0.0	0.0	0.0	0.0
112408Z	10.8	82.0	30	10.6	81.4	35	17	5	11.7	77.0	20	256	-5	0.0	0.0	0.0	0.0	0.0	0.0
112414Z	11.4	81.3	30	11.0	80.4	35	47	5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
112420Z	12.2	80.0	25	11.9	79.4	30	74	5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
112502Z	12.9	80.4	25	11.9	79.4	30	92	5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
112508Z	13.8	80.5	25	13.4	80.0	25	29	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
112514Z	14.5	79.7	14	14.5	79.4	20	4	5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

ALL FORECASTS			
MMG	24-HR	48-HR	72-HR
AVG FORECAST POSIT ERROR	42	148	163
AVG HIGH ANGLE ERROR	71	83	21
AVG INTENSITY MAGNITUDE ERROR	4	6	15
AVG INTENSITY BIAS	4	4	15
NUMBER OF FORECASTS	10	5	2

## ANNEX B

## TROPICAL CYCLONE FIX DATA

## 1. WESTERN NORTH PACIFIC CYCLONE FIX DATA

NOTICE - THE ASTERISKS (\*) INDICATE FIXES UNREPRESENTATIVE AND NOT USED FOR BEST TRACK PURPOSES.

## TYPHOON ALICE

## SATELLITE FIXES

FIX NO.	TIME (Z)	FIX POSITION	ACCR	UNPAK CODE	SATELLITE	COMMENTS	SITE
* 1	310900	13.0N 172.7E	PCN 6		DMC97A		PGTW
2	011236	13.0N 170.4E	PCN 6		DMC97A		PGTW
3	011419	13.0N 167.3E	PCN 6	T2.5/2.5	DMC97A	INIT JMS	KGWC
4	012151	13.0N 164.0E	PCN 6	T2.0/2.0	DMC97A	INIT JMS	PGTW
* 5	012336	13.0N 165.5E	PCN 6		DMC97A		KGWC
6	020351	13.0N 167.5E			GNFS1		PHIK
7	020901	13.0N 167.0E	PCN 6		DMC97A		PGTW
8	021218	13.0N 167.0E	PCN 6		DMC97A		PGTW
9	021400	13.0N 167.4E	PCN 6		DMC97A		KGWC
10	022133	13.0N 167.7E	PCN 6	T2.0/2.0 /50.0/24HRS	DMC97A		PGTW
11	022318	13.0N 167.3E	PCN 2		DMC97A		KGWC
12	020741	13.0N 168.0E	PCN 6		DMC97A		PGTW
13	031200	13.0N 168.3E	PCN 6	T3.5/3.5 /01.0/20HRS	DMC97A		KGWC
14	031440	13.0N 167.1E	PCN 6		DMC97A		PHIK
15	032116	13.0N 168.0E	PCN 6	T3.0/3.0 /01.0/24HRS	DMC97A		PGTW
16	032150	13.0N 168.0E			GNFS1		PHIK
17	040042	13.0N 167.0E	PCN 5		DMC97A		PGTW
18	040350	13.0N 167.1E			GNFS1		PHIK
19	040957	13.0N 167.4E	PCN 6		DMC97A		PGTW
20	042002	13.0N 165.6E	PCN 4		DMC97A		PGTW
21	042058	13.0N 165.5E	PCN 4	T3.5/3.5 /00.5/24HRS	DMC97A		PGTW
22	040024	13.0N 165.0E	PCN 3		DMC97A		PGTW
23	040350	13.0N 164.5E			GNFS1		PHIK
24	040939	13.0N 167.7E	PCN 6		DMC97A		PGTW
25	051305	13.0N 167.6E	PCN 6		DMC97A		PGTW
26	051443	13.0N 167.4E	PCN 4	T4.0/4.0 /00.5/23HRS	DMC97A		PGTW
27	060006	13.0N 161.7E	PCN 1		DMC97A		PGTW
28	060923	13.0N 160.0E	PCN 2		DMC97A		PGTW
29	060922	13.0N 150.7E	PCN 2		DMC97A		PGTW
30	061247	13.0N 150.2E	PCN 2		DMC97A		PGTW
31	061923	13.0N 150.1E	PCN 1		DMC97A		PGTW
32	062205	13.0N 157.9E	PCN 1	T5.0/5.0 /01.0/24HRS	DMC97A		PGTW
33	062348	13.0N 157.4E	PCN 2		DMC97A		PGTW
34	070350	13.0N 157.0E			GNFS1		PHIK
35	070804	13.0N 154.3E	PCN 2		DMC97A	CI UP	PGTW
36	071013	13.0N 154.6E			GNFS1		PHIK
37	071047	13.0N 154.7E	PCN 2		DMC97A		PGTW
38	071230	13.0N 154.3E	PCN 2		DMC97A		PGTW
39	072147	13.0N 157.2E	PCN 1	T6.0/6.0 /01.0/24HRS	DMC97A		PGTW
40	080112	13.0N 152.5E	PCN 1		DMC97A		PGTW
41	080926	13.0N 151.2E	PCN 5		DMC97A		PGTW
42	080926	13.0N 152.1E	PCN 6		DMC97A	INIT JMS	RODN
43	081029	13.0N 151.0E	PCN 5		DMC97A		PGTW
44	081353	13.0N 150.1E	PCN 2		DMC97A		PGTW
45	082025	13.0N 148.6E	PCN 5		DMC97A		PGTW
46	080854	13.0N 147.5E	PCN 4	T4.5/5.5 /01.5/27HRS	DMC97A		PGTW
47	080906	13.0N 145.7E	PCN 6		DMC97A		PGTW
48	091011	13.0N 145.7E	PCN 6		DMC97A		PGTW
49	091325	13.0N 145.2E	PCN 6		DMC97A		PGTW
50	092254	13.0N 147.3E	PCN 1	T3.5/4.5 /01.0/23HRS	DMC97A		PGTW
51	100217	13.0N 142.6E	PCN 1		DMC97A		PGTW
52	100946	13.0N 140.7E	PCN 6		DMC97A		RODN
53	100946	13.0N 140.9E	PCN 6		DMC97A		PGTW
54	101136	13.0N 140.4E	PCN 1		DMC97A		PGTW
55	101317	13.0N 140.1E	PCN 2		DMC97A		PGTW
56	102127	13.0N 130.3E	PCN 1	T4.0/4.5 /00.5/19HRS	DMC97A		RPMK
57	102127	13.0N 130.3E	PCN 2	T3.5/3.5 /50.0/23HRS	DMC97A		PGTW
58	102236	13.0N 130.1E	PCN 2		DMC97A		PGTW
59	110159	13.0N 134.7E	PCN 1		DMC97A		PGTW
60	111008	13.0N 134.0E	PCN 1		DMC97A	CI UP	RODN
61	111008	13.0N 134.0E	PCN 1		DMC97A		PGTW
62	111118	13.0N 137.0E	PCN 2		DMC97A		PGTW
63	111441	13.0N 137.7E	PCN 1		DMC97A		PGTW
64	112107	13.0N 137.5E	PCN 2		DMC97A		PGTW
65	112108	13.0N 137.4E	PCN 2		DMC97A		RODN
66	112218	13.0N 137.1E	PCN 2	T3.5/3.5 /50.0/25HRS	DMC97A		PGTW
67	120141	13.0N 137.1E	PCN 1	T4.0/4.0 /50.0/24HRS	DMC97A		RPMK
68	120141	13.0N 137.1E	PCN 1		DMC97A		PGTW
69	120948	13.0N 134.6E	PCN 6		DMC97A		RPMK
70	120949	13.0N 134.3E	PCN 6		DMC97A		PGTW
71	121100	13.0N 134.2E	PCN 6		DMC97A		PGTW
72	121423	13.0N 134.4E	PCN 4		DMC97A		PGTW
73	122048	13.0N 134.6E	PCN 5		DMC97A		PGTW
74	122343	13.0N 134.7E	PCN 3	T3.5/3.5 /50.0/24HRS	DMC97A		PGTW
* 75	130928	13.0N 137.5E	PCN 4		DMC97A		PGTW
* 76	130929	13.0N 137.4E	PCN 2		DMC97A		RODN
* 77	131042	13.0N 137.7E	PCN 6		DMC97A		PGTW
78	131405	13.0N 137.4E	PCN 6		DMC97A		PGTW

19	142028	14.24	144.1E	PCN 6	DWGRPT	RODN
20	142028	14.14	134.1E	PCN 5	DWGRPT	PGTW
21	142325	14.14	134.4E	PCN 5	DWGRPT	PGTW
42	140185	14.04	134.4E	PCN 3	DWGRPT	PGTW
53	140909	14.44	144.7E	PCN 6	DWGRPT	RODN
84	140909	14.24	134.4E	PCN 6	DWGRPT	PGTW
65	142307	17.14	137.1E	PCN 3	DWGRPT	PGTW

# ATCRAFT FIXES

FIX NO.	TIME (Z)	FIX POSITION	FLT LVL	70043 HGT	085 MSLP	MAX-RFC-WND VEL/RRG/RND	MAX-FLT-LVL-WND NTR/VEL/RRG/RND	ACFTY NAV/MET	EYE SHAPE	EYE ORIEN- DIAM/TATION	EYE TEMP (C) DIR/ IN/ OP/CLT	WSN NO.
1	020115	5.74 144.5E	1500FT	946	65 180	35	220	72 140 35	5 2		+25 +25 +25	1
2	021520	4.54 147.6E	700MM	944	984			60 240 30	12 5		+12 +15 +11	2
3	030853	7.24 144.0E	700MM	9771		55 120	15	210 60 140 24			+15 + 8	3
4	030310	7.74 144.3E	700MM	9934	982	45 060	40	140 52 000 35	2 2		+13 +15 +10	3
5	040210	4.34 147.4E	700MM	9942	983	55 310	45	440 53 310 45	2 4		+13 +17 + 8	6
6	041523	4.54 144.2E	700MM	9931	983			110 54 200 40	4 5		+11 +11 +11	7
7	041302	10.34 147.3E	700MM	9847	972			130 74 040 30			+16 +14	10
8	041423	10.44 147.1E	700MM	9825	969			100 79 100 20	10 3	CIRCULAR	+13 +15 +13	10
9	040259	11.54 141.0E	700MM	9807	968	95 340	14	100 70 340 20	4 4	ELLIPTICAL	+10 +14 +10	11
10	041213	12.14 154.2E	700MM	9763	963			120 87 030 27			+17 +11	12
11	041427	12.24 154.0E	700MM	9767	961			400 88 300 10	4 5	ELLIPTICAL	+12 +15 +13	12
12	070008	12.34 157.6E	700MM	9674					4 4			13
13	070256	12.44 157.0E	700MM	9645	949	80 010	20	170 102 040 20	4 4	CIRCULAR	+14 +18 +13	13
14	071407	12.54 154.7E	700MM	9541	937			170 96 090 24	15 4	CIRCULAR	+13 +18 +11	14
15	071820	12.24 154.2E	700MM	9470	930			470 126 010 14			+21 +10	14
16	072040	12.24 151.5E	700MM	9477	928	100 330	5	040 105 360 15	14 2	CIRCULAR	+15 +24 +10	14
17	080010	12.24 157.8E	700MM	9544	938	100 170		170 115 140 10			+22 +12	15
18	080247	12.14 152.4E	700MM	9537	935	130 060	20	140 115 060 10	4 4	CIRCULAR	+13 +20 +12	15
19	081302	12.24 144.8E	700MM	9690	954			120 60 090 30			+24 + 8	16
20	041508	11.94 144.6E	700MM	9743	957			040 80 360 21	3 4	ELLIPTICAL	+ 8 +23 + 8	16
21	082219	11.94 144.1E	700MM	9773	944	110 250	10	330 30 270 60	4 4	CIRCULAR	+12 +23 +13	17
22	082022	11.94 147.4E	700MM	9771	964	30 180	10	030 75 300 10	4 4	CIRCULAR	+11 +23 +10	17
23	080801	12.14 144.6E	700MM	9845		95 210		130 107 050 14			+23 + 9	18
24	080840	12.14 144.1E	700MM	9857	974			000 94 230 20	4 4		+18 +22 +10	18
25	081634	12.14 144.8E	700MM	9840	973			140 90 040 10	2 4	CIRCULAR	+12 +18 +11	19
26	082054	11.74 147.6E	700MM	9842	970	60 030	50	110 87 030 30	4 5	ELLIPTICAL	+12 +15 +10	20
27	100445	12.24 141.4E	700MM	9804	965	65 090	20	150 99 090 10	4 2	CIRCULAR	+13 +18	21
28	101742	12.34 139.2E	700MM	9808	953			340 86 280 14	4 4	CIRCULAR	+12 +19 +14	23
29	102105	12.34 139.2E	700MM	9644	949			040 90 330 30			+20 +13	23
30	102010	12.54 134.5E	700MM	9604	943	45 160	15	100 105 010 30	4 5	CIRCULAR	+12 +21 +12	23
31	111245	11.34 137.6E	700MM	9597				100 80 100 15			+15 + 5	24
32	111530	11.34 137.3E	700MM	9563	938			000 85 340 14	10 5	CIRCULAR	+12 +21 + 6	24
33	120104	11.94 137.1E	700MM	9673		120 150	8	220 110 150 14	4 3	CIRCULAR	+21 +10	25
34	120254	14.04 137.0E	700MM	9625	946	120 150	8	220 110 150 14	4 3	CIRCULAR	+11 +22 +11	25
35	121459	14.44 134.5E	700MM	9789	965			130 84 050 4	4 5	CIRCULAR	+10 +16 +11	26
36	121504	15.14 134.5E	700MM	9784	943			120 90 090 2				26
37	122013	15.24 134.7E	700MM	9781	961			100 83 360 7	10 3	CIRCULAR	+11 +17 +11	26
38	120028	15.44 134.4E	700MM	9859		40 030	35	110 65 030 14			+23	27
39	120253	15.74 134.7E	700MM	9425	977	55 090	15	090 40 340 60	4 2	CIRCULAR	+12 +18	27
40	121226	16.14 137.2E	700MM	9459	985			170 67 100 20			+10 +10	28
41	121517	16.34 137.2E	700MM	9417	989			040 57 260 30	4 4		+13 +20 +10	28
42	140004	14.54 134.7E	700MM	9124	1005	50 330	20	140 45 040 60			+18 + 7	29
43	140308	14.14 134.2E	700MM	9145		30 150	30	140 35 340 90	4 5		+16 +15 + 4	29

# RAJAR FIXES

FIX NO.	TIME (Z)	FIX POSITION	RAJAR	ACFTY	EYE SHAPE	EYE DIAM	RAJAR-CODE	RAJAR-TUOFF	COMMENTS	RAJAR POSITION	RTF WND NO.
1	010330	7.74 144.2E	LAND	PNDR					PERL CNTN	8.74 147.7E	01346
2	010620	4.44 144.0E	LAND	PNDR					PERL CNTN	8.74 147.7E	01346
3	010730	4.24 144.2E	LAND	FAIR					PERL FVF	8.74 147.7E	01346
4	010830	4.34 144.2E	LAND	FAIR					PERL CNTN	8.74 147.7E	01346
5	010930	4.54 144.2E	LAND	PNDR					PERL CNTN	8.74 147.7E	01346
6	011130	4.64 144.2E	LAND	PNDR					PERL CNTN	8.74 147.7E	01346
7	012230	4.14 147.7E	LAND	FAIR					PERL CNTN	8.74 147.7E	01346
8	040130	4.34 147.4E	LAND	PNDR					PERL CNTN	8.74 147.7E	01346
9	040530	4.44 147.6E	LAND	PNDR					PERL CNTN	8.74 147.7E	01346
10	040730	4.64 147.4E	LAND	GNDD					PERL FVF	8.74 147.7E	01346
11	040900	4.44 147.5E	LAND	GNDD					PERL FVF	8.74 147.7E	01346
12	040830	4.54 147.5E	LAND	GNDD					PERL FVF	8.74 147.7E	01346
13	040900	4.44 147.7E	LAND	GNDD					PERL FVF	8.74 147.7E	01346
14	040930	4.54 147.1E	LAND	FAIR					PERL FVF	8.74 147.7E	01346
15	041000	4.44 147.1E	LAND	FAIR					PERL FVF	8.74 147.7E	01346
16	041100	4.54 144.9E	LAND	PNDR					PERL CNTN	8.74 147.7E	01346
17	041130	4.54 144.8E	LAND	PNDR					PERL CNTN	8.74 147.7E	01346
18	000435	12.34 144.4E	LAND	PNDR					PERL CNTN	8.74 147.7E	01346
19	000510	12.34 144.7E	LAND	PNDR					PERL CNTN	8.74 147.7E	01346
20	000535	12.34 144.7E	LAND	PNDR					PERL CNTN	8.74 147.7E	01346
21	000610	12.34 144.5E	LAND	PNDR					PERL CNTN	8.74 147.7E	01346

22	000535	12.74	144.4E	LAND	PQDR
23	000705	12.74	144.3E	LAND	PQDR
24	000735	12.74	144.2E	LAND	PQDR
25	000805	12.64	144.2E	LAND	PQDR
26	000935	12.74	144.8E	LAND	FAIR
27	030910	12.74	144.8E	LAND	PQDR
28	000935	12.64	144.7E	LAND	FAIR
29	001010	12.64	144.7E	LAND	PQDR
30	001035	12.74	144.7E	LAND	FAIR
31	001105	12.64	144.5E	LAND	FAIR
32	001135	12.74	144.3E	LAND	FAIR
33	001205	12.74	144.3E	LAND	GOOD
34	001235	12.74	144.2E	LAND	FAIR
35	001310	12.74	144.0E	LAND	GOOD
36	001335	12.74	144.9E	LAND	GOOD
37	001410	12.74	144.8E	LAND	FAIR
38	001435	12.64	144.7E	LAND	FAIR
39	001510	12.64	144.7E	LAND	FAIR
40	001535	12.64	144.6E	LAND	FAIR
41	001510	12.64	144.5E	LAND	FAIR
42	001635	12.74	144.4E	LAND	FAIR

28  
28

HALL CLN VSSL 204-N	13.64	144.9E	Q1210
HALL CLN VSSL 204-NNE	13.64	144.9E	Q1210
HALL CLN VSSL 204-N	13.64	144.9E	Q1210
HALL CLN VSSL 204-NNE	13.64	144.9E	Q1210
HALL CLN 204-NNE	13.64	144.9E	Q1210
HALL CLN 204-N	13.64	144.9E	Q1210
HALL CLN 204-NNE	13.64	144.9E	Q1210
HALL CLN 204-NNE	13.64	144.9E	Q1210
HALL CLN 204-N	13.64	144.9E	Q1210
HALL 204-NNE	13.64	144.9E	Q1210
HALL 204-N	13.64	144.9E	Q1210
GOOD FTR WALL CLN OPEN E-204	13.64	144.9E	Q1210
GOOD FTR WALL CLN OPEN ENE-204	13.64	144.9E	Q1210
HVV ATTENUATION	13.64	144.9E	Q1210
HVV ATTENUATION	13.64	144.9E	Q1210
HVV ATTENUATION	13.64	144.9E	Q1210
HVV ATTENUATION	13.64	144.9E	Q1210
HVV ATTENUATION	13.64	144.9E	Q1210

# TYPHOON AREA

## SATELLITE FIXES

FIX NO.	TIME (Z)	FIX POSITION	ACFT	UNIQUE CODE	SATELLITE	COMMENTS	SITE
1	141103	10.4N 141.5E	PCN 5		DMSP3A		PGTW
2	140903	10.4N 141.0E	PCN 6	T4.0/0.0	DMSP3A	INII JDS	PGTW
3	142315	10.0N 141.0E	PCN 6	T1.5/1.5 /01.5/23HRC	DMSP3A		PGTW
4	141157	10.4N 142.5E	PCN 6		DMSP3A		PGTW
5	141306	10.4N 142.0E	PCN 6		DMSP3A		PGTW
6	142103	10.4N 142.0E	PCN 6	T2.5/2.5 /01.0/23HRC	DMSP3A		PGTW
7	142258	10.4N 142.1E	PCN 5		DMSP3A		PGTW
8	240108	10.5N 141.7E	PCN 5		DMSP3A		PGTW
9	240148	11.2N 142.2E	PCN 5	T1.5/1.5	DMSP3A	INII JDS	RPWK
10	240943	10.4N 140.1E	PCN 6		DMSP3A		PGTW
11	241140	10.4N 139.9E	PCN 5		DMSP3A		PGTW
12	241430	11.2N 139.4E	PCN 6		DMSP3A		PGTW
13	242043	11.0N 139.9E	PCN 6		DMSP3A		PGTW
14	242240	11.4N 139.0E	PCN 5	T3.5/3.5 /01.0/24HRC	DMSP3A		PGTW
15	241030	11.3N 139.0E	PCN 4		DMSP3A		PGTW
16	241030	11.3N 139.0E	PCN 5	T4.0/2.5 /01.0/24HRC	DMSP3A		RPWK
17	241923	12.4N 137.0E	PCN 4		DMSP3A		PGTW
18	241924	12.1N 137.3E	PCN 4		DMSP3A		RPWK
19	241122	12.7N 137.3E	PCN 4		DMSP3A		PGTW
20	241411	12.3N 136.7E	PCN 3		DMSP3A		PGTW
21	242043	11.3N 138.7E	PCN 6		DMSP3A		RPWK
22	240004	11.4N 134.9E	PCN 4	T4.0/4.0 /00.5/25HRC	DMSP3A		PGTW
23	240112	11.3N 134.0E	PCN 4		DMSP3A		PGTW
24	240112	11.3N 134.3E	PCN 5	T3.5/3.5	DMSP3A	INII JDS	RPWK
25	241104	11.4N 134.0E	PCN 1		DMSP3A		PGTW
26	241353	11.0N 134.1E	PCN 5		DMSP3A		PGTW
27	241353	11.0N 134.2E	PCN 5		DMSP3A		PGTW
28	242144	11.4N 134.9E	PCN 2	T4.0/4.0 /50.0/22HRC	DMSP3A		PGTW
29	242346	11.0N 134.9E	PCN 1		DMSP3A		PGTW
30	242335	11.5N 134.9E	PCN 1		DMSP3A		PGTW
31	242335	11.3N 134.1E	PCN 1	T4.0/4.0	DMSP3A	INII JDS	PGTW
32	241025	12.5N 134.7E	PCN 1		DMSP3A		PGTW
33	241228	12.3N 134.0E	PCN 1		DMSP3A		PGTW
34	241228	12.1N 134.3E	PCN 1		DMSP3A		RPWK
35	241517	12.3N 134.4E	PCN 1		DMSP3A		RPWK
36	241517	12.1N 134.4E	PCN 2		DMSP3A		PGTW
37	242125	12.1N 137.7E	PCN 1	T3.5/4.0 /00.5/24HRC	DMSP3A		PGTW
38	242328	12.3N 137.4E	PCN 4		DMSP3A		PGTW
39	240216	10.4N 138.5E	PCN 5		DMSP3A		PGTW
40	240217	10.7N 138.9E	PCN 5	T3.0/4.0 /02.0/24HRC	DMSP3A		RPWK
41	240217	10.4N 138.5E	PCN 5	T3.0/3.0	DMSP3A	INII JDS	RPWK
42	241005	21.2N 140.1E	PCN 5		DMSP3A	CI JDS	PGTW
43	241005	20.3N 140.0E	PCN 5		DMSP3A		RPWK
44	241210	21.3N 140.0E	PCN 5		DMSP3A		PGTW
45	241317	21.5N 141.3E	PCN 6		DMSP3A		PGTW
46	242104	21.7N 141.0E	PCN 5	T1.5/2.5 /02.0/24HRC	DMSP3A		PGTW
47	242105	21.2N 141.1E	PCN 5	T1.5/2.5 /01.5/14HRC	DMSP3A		RPWK

## AIRCHART FIXES

FIX NO.	TIME (Z)	FIX POSITION	FLT	70042	705	MAX-SFC-WND	MAX-FLT-LVL-WND	ACFT	EYE SHAPE	EYE ORIENT	EYE TEMP (C)	WIND
1	240254	10.4N 141.1E	1500F1		1005	75 100	60 040	50 300	40	2	4	1
2	240330	10.7N 140.0E	700MM								0.24 0.25 0.23 0.25	1
3	240455	10.4N 140.3E	700MM	1089	1001	70 050	50 140	30 050	120	4	10	2
4	241200	10.4N 140.0E	700MM	1101	1002		240	23 160	60	4	10	2
5	241433	10.4N 140.0E	700MM	1090	1004		340	32 310	30	4	11	2
6	241813	11.3N 138.5E	700MM	1032	994	35 140	40 070	46 340	54	4	4	4
7	241300	11.1N 141.1E	700MM	2470	487		170	61 080	30	2	4	4
8	241744	11.3N 134.0E	700MM	2445	384							5
9	242006	11.3N 134.0E	700MM	2422	981		220	63 150	60	10	4	5
10	240920	11.4N 134.0E	700MM	2812	969	75 090	70 140	40 130	60	2	2	7
11	240925	11.2N 134.0E	700MM	2704	963	55 130	45 200	49 140	30	2	2	4
12	240607	12.1N 134.2E	700MM	2731	959	80 120	15 070	78 340	24	4	2	4
13	240835	12.6N 134.0E	700MM	2747	961	70 140	10 200	128 140	15	4	2	4
14	241942	12.4N 134.9E	700MM	2841	977		140	63 130	20			10
15	242122	12.1N 137.3E	700MM	2867	974	120 270	15 270	110 230	4	7	2	10
16	240616	20.4N 134.2E	700MM	2446	989	110 110	15 200	120 160	14	2	4	11
17	240954	20.4N 139.0E	700MM	2449	990	100 110	10 200	86 170	10	2	10	11

## DATA FIXES

FIX NO.	TIME (Z)	FIX POSITION	WIND	ACFT	EYE SHAPE	EYE DIA	WIND-COUE	COMMENTS	WIND POSITION	WIND NO.
1	241200	12.7N 134.9E	SHIP	0700				WIND NW AT 6 ANOTS	13.1N 137.3E	4444

# TYPHOON CECIL

KATELITE FIXES

FIA NO.	TIME (Z)	FIX POSITION	ACRY	UNRAK CODE	SATELLITE	COMMENTS	STLE
1	002225	10.0N 147.0E	PCV 5	10.0/0.0	DMSP 1A	INIT JGS	PGTH
2	002300	10.0N 147.0E	PCV 6	10.0/0.0 /50.0/24HRS	DMSP 1A		PGTH
3	002331	10.0N 147.0E	PCV 6	10.0/0.0 /01.5/24HRS	DMSP 1A		PGTH
4	002312	10.0N 147.0E	PCV 6		DMSP 1A		PGTH
5	002314	10.0N 147.0E	PCV 5	11.5/1.5 /00.5/24HRS	DMSP 1A		PGTH
6	010910	10.0N 136.0E	PCV 6		DMSP 1A		PGTH
7	010911	10.0N 136.0E	PCV 6		DMSP 1A		PGTH
8	011155	10.0N 136.0E	PCV 5		DMSP 1A	INIT JGS STORM ON EDGE OF DATA	PGTH
9	011436	10.0N 136.0E	PCV 6		DMSP 1A		PGTH
10	011436	10.0N 136.0E	PCV 6		DMSP 1A		PGTH
11	011451	10.0N 137.0E	PCV 5	13.0/3.0 /01.5/24HRS	DMSP 1A	INIT JGS	PGTH
12	012256	10.0N 137.0E	PCV 5		DMSP 1A		PGTH
13	020136	10.0N 136.0E	PCV 5	13.0/3.0	DMSP 1A	INIT JGS	PGTH
14	020136	10.0N 136.0E	PCV 5		DMSP 1A		PGTH
15	020136	10.0N 136.0E	PCV 5	13.0/3.0	DMSP 1A	INIT JGS	PGTH
16	021616	10.0N 136.0E	PCV 5		DMSP 1A		PGTH
17	021616	10.0N 136.0E	PCV 5		DMSP 1A		PGTH
18	022131	10.0N 136.0E	PCV 5	13.0/3.0 /50.0/24HRS	DMSP 1A		PGTH
19	030020	10.0N 136.0E	PCV 5		DMSP 1A		PGTH
20	030250	10.0N 136.0E	PCV 5		DMSP 1A		PGTH
21	031011	10.0N 136.0E	PCV 6		DMSP 1A		PGTH
22	031114	10.0N 136.0E	PCV 6		DMSP 1A		PGTH
23	031307	10.0N 136.0E	PCV 5		DMSP 1A		PGTH
24	031359	10.0N 136.0E	PCV 6		DMSP 1A		PGTH
25	031358	10.0N 136.0E	PCV 5		DMSP 1A		PGTH
26	032111	10.0N 136.0E	PCV 5		DMSP 1A		PGTH
27	040002	10.0N 136.0E	PCV 5	13.5/3.5 /00.5/24HRS	DMSP 1A		PGTH
28	040239	10.0N 136.0E	PCV 5	14.0/4.0	DMSP 1A	INIT JGS	PGTH
29	040239	10.0N 136.0E	PCV 5		DMSP 1A		PGTH
30	040239	10.0N 136.0E	PCV 5	13.5/3.5	DMSP 1A	INIT JGS	PGTH
31	040952	10.0N 136.0E	PCV 6		DMSP 1A		PGTH
32	041203	10.0N 136.0E	PCV 6		DMSP 1A		PGTH
33	041520	10.0N 136.0E	PCV 6		DMSP 1A		PGTH
34	041521	10.0N 136.0E	PCV 5		DMSP 1A		PGTH
35	041521	10.0N 136.0E	PCV 5		DMSP 1A		PGTH
36	042233	10.0N 136.0E	PCV 5	14.5/4.5 /01.0/24HRS	DMSP 1A		PGTH
37	042346	10.0N 136.0E	PCV 5		DMSP 1A		PGTH
38	040221	10.0N 136.0E	PCV 5		DMSP 1A		PGTH
39	040221	10.0N 136.0E	PCV 5	14.5/4.5 /01.0/24HRS	DMSP 1A		PGTH
40	040332	10.0N 136.0E	PCV 5		DMSP 1A	SPLIT PASS	PGTH
41	041225	10.0N 136.0E	PCV 5		DMSP 1A		PGTH
42	041502	10.0N 136.0E	PCV 5		DMSP 1A		PGTH
43	041502	10.0N 136.0E	PCV 5		DMSP 1A		PGTH
44	042213	10.0N 136.0E	PCV 5	14.0/4.0 /40.5/24HRS	DMSP 1A		PGTH
45	042213	10.0N 136.0E	PCV 5	13.0/4.0 /41.5/24HRS	DMSP 1A		PGTH
46	040203	10.0N 136.0E	PCV 5	14.0/4.0	DMSP 1A	INIT JGS	PGTH
47	040203	10.0N 136.0E	PCV 5		DMSP 1A		PGTH
48	040203	10.0N 136.0E	PCV 5		DMSP 1A		PGTH
49	041053	10.0N 136.0E	PCV 5		DMSP 1A		PGTH
50	041053	10.0N 136.0E	PCV 5		DMSP 1A		PGTH
51	041053	10.0N 136.0E	PCV 5		DMSP 1A		PGTH
52	041208	10.0N 136.0E	PCV 5		DMSP 1A		PGTH
53	041444	10.0N 136.0E	PCV 5		DMSP 1A		PGTH
54	041444	10.0N 136.0E	PCV 5		DMSP 1A		PGTH
55	042153	10.0N 136.0E	PCV 5	14.0/4.0 /50.0/24HRS	DMSP 1A		PGTH
56	042153	10.0N 136.0E	PCV 5	14.5/4.5 /01.5/24HRS	DMSP 1A		PGTH
57	040300	10.0N 136.0E	PCV 5	14.5/4.5 /01.5/24HRS	DMSP 1A		PGTH
58	040326	10.0N 136.0E	PCV 5		DMSP 1A		PGTH
59	041033	10.0N 136.0E	PCV 5		DMSP 1A		PGTH
60	041033	10.0N 136.0E	PCV 5		DMSP 1A		PGTH
61	041332	10.0N 136.0E	PCV 5		DMSP 1A		PGTH
62	041426	10.0N 136.0E	PCV 5		DMSP 1A		PGTH
63	041508	10.0N 136.0E	PCV 5		DMSP 1A		PGTH
64	041508	10.0N 136.0E	PCV 5		DMSP 1A		PGTH
65	042133	10.0N 136.0E	PCV 5		DMSP 1A	N/A DATA TO TERMINATOR	PGTH
66	040032	10.0N 136.0E	PCV 5	12.5/3.5 /41.5/24HRS	DMSP 1A		PGTH
67	040308	10.0N 136.0E	PCV 5	13.0/4.0 /41.5/24HRS	DMSP 1A		PGTH
68	040308	10.0N 136.0E	PCV 5	13.0/4.0 /41.5/24HRS	DMSP 1A		PGTH
69	041013	10.0N 136.0E	PCV 5		DMSP 1A		PGTH
70	041314	10.0N 136.0E	PCV 5		DMSP 1A		PGTH
71	041549	10.0N 136.0E	PCV 5		DMSP 1A		PGTH
72	041549	10.0N 136.0E	PCV 5		DMSP 1A		PGTH
73	040014	10.0N 136.0E	PCV 5	13.5/3.5 /01.0/24HRS	DMSP 1A		PGTH
74	040249	10.0N 136.0E	PCV 5	13.0/3.0 /50.0/24HRS	DMSP 1A		PGTH
75	040249	10.0N 136.0E	PCV 5		DMSP 1A		PGTH
76	040753	10.0N 136.0E	PCV 5		DMSP 1A	CI DATA	PGTH
77	041531	10.0N 136.0E	PCV 5		DMSP 1A		PGTH
78	041531	10.0N 136.0E	PCV 5		DMSP 1A		PGTH
79	042357	20.0N 136.0E	PCV 5	12.5/3.5	DMSP 1A	INIT JGS	PGTH
80	042357	20.0N 136.0E	PCV 5	13.0/3.5 /40.5/24HRS	DMSP 1A		PGTH
81	040733	20.0N 136.0E	PCV 5		DMSP 1A		PGTH
82	041238	20.0N 136.0E	PCV 5		DMSP 1A	CI DATA	PGTH
83	041238	20.0N 136.0E	PCV 5		DMSP 1A		PGTH
84	041513	20.0N 136.0E	PCV 5		DMSP 1A		PGTH
85	041513	20.0N 136.0E	PCV 5		DMSP 1A		PGTH
86	041513	20.0N 136.0E	PCV 5		DMSP 1A		PGTH
87	042338	20.0N 136.0E	PCV 5		DMSP 1A	EXPENSE ILC SYSTEM DISSEPTED	PGTH

# AIRCRAFT FIXES

FLA NO.	TIME (Z)	FIX POSITION	FLT INL	THU 44	DRS	MAX-SFC-WND	MAX-IRG-WND	MAX-FLT-LVL-WND	APPRY	EYE SHAPE	EYE ORIENT	BYF TEMP (F)	WSN
				MUT	MSLP	VEL/IRG/WND	DIR/VEL/IRG/WND	NAV/MFI				DP/SEC	NO.
1	142353	14.44 134.7E	700MM	1000	1000	30 290	5 240	30 120	30 4 4			+11 +16 +11	26 3
2	142414	14.44 134.7E	700MM	1000	1000	30 290	5 240	30 120	30 4 4	CIRCULAR	12	+11 +16 +11	26 3
3	142428	14.44 134.7E	700MM	1000	1000	30 290	5 240	30 120	30 4 4			+11 +16 +11	26 3
4	142440	14.44 134.7E	700MM	1000	1000	30 290	5 240	30 120	30 4 4			+11 +16 +11	26 3
5	142451	14.44 134.7E	700MM	1000	1000	30 290	5 240	30 120	30 4 4	CIRCULAR	40	+11 +16 +11	26 3
6	142510	14.44 134.7E	700MM	1000	1000	30 290	5 240	30 120	30 4 4			+11 +16 +11	26 3
7	142524	14.44 134.7E	700MM	1000	1000	30 290	5 240	30 120	30 4 4			+11 +16 +11	26 3
8	142538	14.44 134.7E	700MM	1000	1000	30 290	5 240	30 120	30 4 4	CIRCULAR	20	+11 +16 +11	26 3
9	142550	14.44 134.7E	700MM	1000	1000	30 290	5 240	30 120	30 4 4			+11 +16 +11	26 3
10	142602	14.44 134.7E	700MM	1000	1000	30 290	5 240	30 120	30 4 4	CIRCULAR	20	+11 +16 +11	26 3
11	142614	14.44 134.7E	700MM	1000	1000	30 290	5 240	30 120	30 4 4			+11 +16 +11	26 3
12	142628	14.44 134.7E	700MM	1000	1000	30 290	5 240	30 120	30 4 4	CIRCULAR	12	+11 +16 +11	26 3
13	142640	14.44 134.7E	700MM	1000	1000	30 290	5 240	30 120	30 4 4			+11 +16 +11	26 3
14	142650	14.44 134.7E	700MM	1000	1000	30 290	5 240	30 120	30 4 4	CIRCULAR	20	+11 +16 +11	26 3
15	142704	14.44 134.7E	700MM	1000	1000	30 290	5 240	30 120	30 4 4			+11 +16 +11	26 3
16	142718	14.44 134.7E	700MM	1000	1000	30 290	5 240	30 120	30 4 4	CIRCULAR	20	+11 +16 +11	26 3
17	142732	14.44 134.7E	700MM	1000	1000	30 290	5 240	30 120	30 4 4			+11 +16 +11	26 3
18	142746	14.44 134.7E	700MM	1000	1000	30 290	5 240	30 120	30 4 4	CIRCULAR	20	+11 +16 +11	26 3
19	142758	14.44 134.7E	700MM	1000	1000	30 290	5 240	30 120	30 4 4			+11 +16 +11	26 3
20	142810	14.44 134.7E	700MM	1000	1000	30 290	5 240	30 120	30 4 4	CIRCULAR	10	+11 +16 +11	26 3
21	142824	14.44 134.7E	700MM	1000	1000	30 290	5 240	30 120	30 4 4			+11 +16 +11	26 3
22	142838	14.44 134.7E	700MM	1000	1000	30 290	5 240	30 120	30 4 4	CIRCULAR	30	+11 +16 +11	26 3
23	142850	14.44 134.7E	700MM	1000	1000	30 290	5 240	30 120	30 4 4			+11 +16 +11	26 3
24	142904	14.44 134.7E	700MM	1000	1000	30 290	5 240	30 120	30 4 4	CIRCULAR	25	+11 +16 +11	26 3
25	142918	14.44 134.7E	700MM	1000	1000	30 290	5 240	30 120	30 4 4			+11 +16 +11	26 3
26	142932	14.44 134.7E	700MM	1000	1000	30 290	5 240	30 120	30 4 4	CIRCULAR	40	+11 +16 +11	26 3
27	142946	14.44 134.7E	700MM	1000	1000	30 290	5 240	30 120	30 4 4			+11 +16 +11	26 3
28	142958	14.44 134.7E	700MM	1000	1000	30 290	5 240	30 120	30 4 4	CIRCULAR	30	+11 +16 +11	26 3
29	143010	14.44 134.7E	700MM	1000	1000	30 290	5 240	30 120	30 4 4			+11 +16 +11	26 3

# RAJAN FIXES

FLA NO.	TIME (Z)	FIX POSITION	RAJAN	APPRY	EYE SHAPE	EYE DIAM	RAJAN-CODE	COMMENTS	NADAR POSITION	CLIFF WND NO.
							ASWAN TOWFF			
1	142700	14.44 134.7E	LAND	PHON	CIRCULAR	14		EYE	15.2N 120.6E	08397
2	142730	14.44 134.7E	LAND	PHON	CIRCULAR	14		SPIRAL RAND	15.2N 120.6E	08397
3	142745	14.44 134.7E	LAND	PHON	CIRCULAR	14		SPIRAL RAND	15.2N 120.6E	08397
4	142755	14.44 134.7E	LAND	PHON	CIRCULAR	14		SPIRAL RAND	15.2N 120.6E	08397
5	142805	14.44 134.7E	LAND	PHON	CIRCULAR	14		SPIRAL RAND	15.2N 120.6E	08397
6	142815	14.44 134.7E	LAND	PHON	CIRCULAR	14		SPIRAL RAND	15.2N 120.6E	08397
7	142825	14.44 134.7E	LAND	PHON	CIRCULAR	14		SPIRAL RAND	15.2N 120.6E	08397
8	142835	14.44 134.7E	LAND	PHON	CIRCULAR	14		SPIRAL RAND	15.2N 120.6E	08397
9	142845	14.44 134.7E	LAND	PHON	CIRCULAR	14		SPIRAL RAND	15.2N 120.6E	08397
10	142855	14.44 134.7E	LAND	PHON	CIRCULAR	14		SPIRAL RAND	15.2N 120.6E	08397
11	142905	14.44 134.7E	LAND	PHON	CIRCULAR	14		SPIRAL RAND	15.2N 120.6E	08397
12	142915	14.44 134.7E	LAND	PHON	CIRCULAR	14		SPIRAL RAND	15.2N 120.6E	08397
13	142925	14.44 134.7E	LAND	PHON	CIRCULAR	14		SPIRAL RAND	15.2N 120.6E	08397
14	142935	14.44 134.7E	LAND	PHON	CIRCULAR	14		SPIRAL RAND	15.2N 120.6E	08397
15	142945	14.44 134.7E	LAND	PHON	CIRCULAR	14		SPIRAL RAND	15.2N 120.6E	08397
16	142955	14.44 134.7E	LAND	PHON	CIRCULAR	14		SPIRAL RAND	15.2N 120.6E	08397
17	143005	14.44 134.7E	LAND	PHON	CIRCULAR	14		SPIRAL RAND	15.2N 120.6E	08397
18	143015	14.44 134.7E	LAND	PHON	CIRCULAR	14		SPIRAL RAND	15.2N 120.6E	08397
19	143025	14.44 134.7E	LAND	PHON	CIRCULAR	14		SPIRAL RAND	15.2N 120.6E	08397
20	143035	14.44 134.7E	LAND	PHON	CIRCULAR	14		SPIRAL RAND	15.2N 120.6E	08397
21	143045	14.44 134.7E	LAND	PHON	CIRCULAR	14		SPIRAL RAND	15.2N 120.6E	08397
22	143055	14.44 134.7E	LAND	PHON	CIRCULAR	14		SPIRAL RAND	15.2N 120.6E	08397
23	143105	14.44 134.7E	LAND	PHON	CIRCULAR	14		SPIRAL RAND	15.2N 120.6E	08397
24	143115	14.44 134.7E	LAND	PHON	CIRCULAR	14		SPIRAL RAND	15.2N 120.6E	08397
25	143125	14.44 134.7E	LAND	PHON	CIRCULAR	14		SPIRAL RAND	15.2N 120.6E	08397
26	143135	14.44 134.7E	LAND	PHON	CIRCULAR	14		SPIRAL RAND	15.2N 120.6E	08397
27	143145	14.44 134.7E	LAND	PHON	CIRCULAR	14		SPIRAL RAND	15.2N 120.6E	08397
28	143155	14.44 134.7E	LAND	PHON	CIRCULAR	14		SPIRAL RAND	15.2N 120.6E	08397
29	143205	14.44 134.7E	LAND	PHON	CIRCULAR	14		SPIRAL RAND	15.2N 120.6E	08397
30	143215	14.44 134.7E	LAND	PHON	CIRCULAR	14		SPIRAL RAND	15.2N 120.6E	08397
31	143225	14.44 134.7E	LAND	PHON	CIRCULAR	14		SPIRAL RAND	15.2N 120.6E	08397
32	143235	14.44 134.7E	LAND	PHON	CIRCULAR	14		SPIRAL RAND	15.2N 120.6E	08397
33	143245	14.44 134.7E	LAND	PHON	CIRCULAR	14		SPIRAL RAND	15.2N 120.6E	08397
34	143255	14.44 134.7E	LAND	PHON	CIRCULAR	14		SPIRAL RAND	15.2N 120.6E	08397
35	143305	14.44 134.7E	LAND	PHON	CIRCULAR	14		SPIRAL RAND	15.2N 120.6E	08397
36	143315	14.44 134.7E	LAND	PHON	CIRCULAR	14		SPIRAL RAND	15.2N 120.6E	08397
37	143325	14.44 134.7E	LAND	PHON	CIRCULAR	14		SPIRAL RAND	15.2N 120.6E	08397
38	143335	14.44 134.7E	LAND	PHON	CIRCULAR	14		SPIRAL RAND	15.2N 120.6E	08397
39	143345	14.44 134.7E	LAND	PHON	CIRCULAR	14		SPIRAL RAND	15.2N 120.6E	08397
40	143355	14.44 134.7E	LAND	PHON	CIRCULAR	14		SPIRAL RAND	15.2N 120.6E	08397
41	143405	14.44 134.7E	LAND	PHON	CIRCULAR	14		SPIRAL RAND	15.2N 120.6E	08397
42	143415	14.44 134.7E	LAND	PHON	CIRCULAR	14		SPIRAL RAND	15.2N 120.6E	08397
43	143425	14.44 134.7E	LAND	PHON	CIRCULAR	14		SPIRAL RAND	15.2N 120.6E	08397
44	143435	14.44 134.7E	LAND	PHON	CIRCULAR	14		SPIRAL RAND	15.2N 120.6E	08397
45	143445	14.44 134.7E	LAND	PHON	CIRCULAR	14		SPIRAL RAND	15.2N 120.6E	08397
46	143455	14.44 134.7E	LAND	PHON	CIRCULAR	14		SPIRAL RAND	15.2N 120.6E	08397
47	143505	14.44 134.7E	LAND	PHON	CIRCULAR	14		SPIRAL RAND	15.2N 120.6E	08397
48	143515	14.44 134.7E	LAND	PHON	CIRCULAR	14		SPIRAL RAND	15.2N 120.6E	08397
49	143525	14.44 134.7E	LAND	PHON	CIRCULAR	14		SPIRAL RAND	15.2N 120.6E	08397
50	143535	14.44 134.7E	LAND	PHON	CIRCULAR	14		SPIRAL RAND	15.2N 120.6E	08397
51	143545	14.44 134.7E	LAND	PHON	CIRCULAR	14		SPIRAL RAND	15.2N 120.6E	08397

## TROPICAL STORM DOT

## SATELLITE FIXES

FIX NO.	TIME (Z)	FIX POSITION	ACCR	ORIGIN CODE	SATELLITE	COMMENTS	SITE
1	042235	4.0N 147.7E	PCN 5	T0.0/0.0	DWSP3A	INIT JDS	PGTW
2	041116	4.2N 147.3E	PCN 5		DWSP3A		PGTW
3	042217	4.2N 147.6E	PCN 5	T0.0/0.0 /50.0/24HRS	DWSP3A		PGTW
4	042138	4.5N 139.0E	PCN 5	T0.0/0.0 /50.0/24HRS	DWSP3A		PGTW
5	041222	4.0N 136.0E	PCN 5		DWSP3A		PGTW
6	042323	4.0N 134.1E	PCN 5	T1.0/1.0 /01.0/24HRS	DWSP3A		PGTW
7	040147	4.1N 134.0E	PCN 5		DWSP3A		PGTW
8	040958	4.2N 137.4E	PCN 5		DWSP3A		PGTW
9	041204	7.2N 134.2E	PCN 5		DWSP3A		PGTW
10	041428	7.4N 137.7E	PCN 5		DWSP3A		PGTW
11	042059	7.3N 137.0E	PCN 5		DWSP3A	NOT AVAIL: EDGE OF DATA	PGTW
12	042305	7.9N 137.7E	PCN 5		DWSP3A	NOT AVAIL: EDGE OF DATA	PGTW
13	140129	7.4N 131.0E	PCN 5		DWSP3A	NOT AVAIL: EDGE OF DATA	PGTW
14	140310	4.1N 134.0E	PCN 5	T1.5/1.5	DWSP3A	INIT JDS	RPMK
15	140938	4.4N 129.0E	PCN 5		DWSP3A		PGTW
16	141146	4.4N 129.1E	PCN 5		DWSP3A		PGTW
17	141410	4.4N 128.7E	PCN 5		DWSP3A		PGTW
18	141411	4.4N 127.0E	PCN 5		DWSP3A		RODN
19	142219	4.3N 124.1E	PCN 5		DWSP3A	N/A OVER LAND	PGTW
20	142219	4.4N 124.0E	PCN 5	T2.5/2.5 /01.0/10HRS	DWSP3A		RPMK
21	140029	4.1N 124.7E	PCN 5		DWSP3A	N/A OVER LAND	PGTW
22	140252	4.4N 124.5E	PCN 5		DWSP3A	N/A OVER LAND	PGTW
23	140252	4.4N 124.5E	PCN 5		DWSP3A		RPMK
24	141059	4.4N 127.0E	PCN 5		DWSP3A		RPMK
25	141100	10.0N 127.0E	PCN 5		DWSP3A		RODN
26	141310	4.4N 127.0E	PCN 5		DWSP3A		RPMK
27	141523	4.1N 127.0E	PCN 5		DWSP3A		RPMK
28	141534	4.2N 127.1E	PCN 5		DWSP3A		RODN
29	142159	11.2N 127.0E	PCN 5		DWSP3A	N/A DUE TO TERMINATOR	PGTW
30	142159	10.4N 127.4E	PCN 5	T1.5/2.5 /01.0/24HRS	DWSP3A		RPMK
31	140011	10.7N 121.5E	PCN 5	T1.5/1.5	DWSP3A		PGTW
32	140234	10.4N 121.2E	PCN 5		DWSP3A		PGTW
33	140339	10.4N 119.2E	PCN 5		DWSP3A		PGTW
34	140440	10.4N 120.4E	PCN 5		DWSP3A		RODN
35	141252	10.7N 120.1E	PCN 5		DWSP3A		PGTW
36	141515	11.7N 119.0E	PCN 5		DWSP3A		PGTW
37	141515	11.3N 119.4E	PCN 5		DWSP3A		RODN
38	142139	12.1N 119.4E	PCN 5		DWSP3A	N/A DUE TO TERMINATOR	PGTW
39	142139	12.1N 119.4E	PCN 5		DWSP3A		RPMK
40	142353	12.0N 119.0E	PCN 5	T3.0/3.0	DWSP3A		RODN
41	142353	12.1N 119.0E	PCN 5	T2.0/2.0 /00.5/24HRS	DWSP3A		PGTW
42	140215	12.2N 119.9E	PCN 5		DWSP3A		RODN
43	140215	12.3N 119.0E	PCN 5		DWSP3A		PGTW
44	141020	13.1N 119.5E	PCN 5		DWSP3A	CI UP & AURING EYE	PGTW
45	141020	13.1N 119.5E	PCN 5		DWSP3A		RPMK
46	141235	13.1N 119.0E	PCN 5		DWSP3A	CI UP & AURING EYE	PGTW
47	141457	13.5N 119.5E	PCN 5		DWSP3A		PGTW
48	141457	13.3N 119.3E	PCN 5		DWSP3A		RPMK
49	142300	13.7N 120.1E	PCN 5		DWSP3A		RPMK
50	142301	13.4N 120.1E	PCN 5	T2.5/3.0 /00.5/24HRS	DWSP3A		RODN
51	140117	14.2N 120.1E	PCN 5		DWSP3A		RODN
52	140117	14.0N 120.3E	PCN 5	T1.5/1.5	DWSP3A	INIT JDS	RPMK
53	140339	13.3N 120.1E	PCN 5		DWSP3A		RODN
54	140339	13.4N 120.3E	PCN 5		DWSP3A		RPMK
55	141000	14.1N 120.6E	PCN 5		DWSP3A		PGTW
56	141000	14.0N 120.6E	PCN 5		DWSP3A		RPMK
57	141217	14.0N 121.1E	PCN 5		DWSP3A		RODN
58	141217	14.2N 121.0E	PCN 5		DWSP3A	PSDL SECONDARY 14.0N 119.7E	PGTW
59	141439	14.3N 121.4E	PCN 5		DWSP3A	SECONDARY AT 14.5N 121.0E	PGTW
60	141439	13.4N 121.0E	PCN 5		DWSP3A		RPMK
61	142240	15.2N 122.5E	PCN 5	T0.0/1.0 /01.5/24HRS	DWSP3A		RPMK
62	142241	15.1N 122.3E	PCN 5	T1.0/2.0 /01.5/24HRS	DWSP3A		RODN
63	140059	15.3N 122.0E	PCN 5		DWSP3A		RODN
64	140320	15.2N 122.7E	PCN 5		DWSP3A		RODN
65	140320	14.4N 127.2E	PCN 5	T1.0/1.5 /00.5/24HRS	DWSP3A		RPMK
66	141121	14.2N 127.9E	PCN 5		DWSP3A		RPMK
67	141159	14.2N 127.9E	PCN 5		DWSP3A		PGTW
68	141159	14.4N 127.0E	PCN 5		DWSP3A		RODN
69	141420	14.4N 124.5E	PCN 5		DWSP3A		PGTW
70	142220	14.4N 124.1E	PCN 5	T1.7/1.0	DWSP3A	INIT JDS	PGTW
71	140441	14.3N 124.4E	PCN 5	T1.0/1.0 /50.0/24HRS	DWSP3A		RODN

# ATCRAFT FIXES

FIX NO.	TIME (Z)	FIX POSITION	FLT LVL	700MM HGT	DRS MSLP	MAX-SFC-WND VEL/IRG/ANG	MAX-FLT-LVL-WND DTM/VEL/IRG/ANG	ACFTY NAV/MFT	EYE SHAPE	EYE ORIENT- DIRECTION	EYE TEMP (C) DUTY IN/ DP/SGT	WSN NO.
1	120313	17.2N 120.5E	700MM	2090	1002	25 160 55	210 34 100 70	2 40			+10 +10	4
2	120209	17.2N 118.4E	700MM	2011		30 180 50	240 30 100 50	1 2			+14 +12 +10	5
3	120117	17.4N 120.0E	700MM	2974	486		020 35 100 15	2 2	ELLIPTICAL	30 20 360	+14 +15 +10	6
4	120100	17.7N 120.2E	700MM	2952		15 340 30	110 32 300 15	1 2				6
5	120314	17.4N 120.5E	700MM	2035		15 100 30	340 39 270 47	1 2	ELLIPTICAL	30 20 360	+13 +12	6
6	120120	17.2N 125.5E	1500FT			25 310 120	210 32 310 90	10 4			+24 +24	8
7	120232	17.4N 125.5E	700MM	3127	1004	25 140 40	140 28 290 30	10 4			+11 +11 +9	8

# RAJAH FIXES

FIX NO.	TIME (Z)	FIX POSITION	HADAR	ACFTY	EYE SHAPE	EYE DIAM	RAINMM-CODE ASWAK TDUFT	COMMENTS	HADAR POSITION	SITE WND NO.
1	120233	17.7N 120.1E	LAND	PRUH	CIRCULAR	20		PSHL CENTER	15.2N 120.6E	08127
2	120303	17.4N 120.1E	LAND	PRUH	CIRCULAR	20			15.2N 120.6E	08127
3	120330	17.4N 120.1E	LAND	PRUH	CIRCULAR	20			15.2N 120.6E	08327
4	120033	17.4N 120.2E	LAND	FAIR	CIRCULAR	20			15.2N 120.6E	08327
5	120105	17.3N 120.2E	LAND	FAIR	CIRCULAR	25		CNTR STNMY SINCE LAST REPORT	15.2N 120.6E	08327
6	120135	17.4N 120.3E	LAND	FAIR	CIRCULAR	25			15.2N 120.6E	08327
7	120205	17.3N 120.2E	LAND	FAIR	CIRCULAR	25			15.2N 120.6E	08327
8	120235	17.3N 120.3E	LAND	FAIR	CIRCULAR	25			15.2N 120.6E	08127
9	120305	17.3N 120.3E	LAND	FAIR	CIRCULAR	25			15.2N 120.6E	08327
10	120410	17.3N 120.4E	LAND	GRUD	CIRCULAR	25			15.2N 120.6E	08327
11	120432	17.0N 120.7E	LAND	GRUD	CIRCULAR	25			15.2N 120.6E	08327
12	120346	17.4N 121.4E	LAND	PRUH	CIRCULAR			EYE DIAM UNK	15.2N 120.6E	08127

# SYNOPTIC FIXES

FIX NO.	TIME (Z)	FIX POSITION	INTENSITY ESTIMATE	VFAREST DATA (NM)	COMMENTS
1	121200	25.0N 120.0E	25	120	
2	170000	22.3N 131.0E	25	60	
3	171200	27.0N 140.5E	25	60	

## TROPICAL DEPRESSION 05

## RAPELITTF FIXES

FIX NO.	TIME (Z)	FIX POSITION	ACRY	OVNBAK CODE	SATFILLITE	COMMENTS	SITE
1	210311	19.3N 114.2E	PCN 5	T1.5/1.5	DMSD14	INIT JMS	RPMK
2	220035	21.4N 118.0E	PCN 3	T1.0/1.0	DMSD14	INIT JMS	PGTW
3	220253	21.4N 118.3E	PCN 3	T1.5/1.5 /50.0/24HRS	DMSD14		RPMK
4	220253	22.1N 118.4E	PCN 3	T1.5/1.5	DMSD14	INIT JMS	RODN
5	210018	22.0N 124.8E	PCN 3	T2.5/2.5 /01.5/24HRS	DMSD14		PGTW
6	210235	22.2N 124.3E	PCN 4		DMSD14		PGTW
7	210235	22.0N 124.5E	PCN 3	T2.5/2.5 /01.0/24HRS	DMSD14		RODN
8	211022	22.5N 124.0E	PCN 3		DMSD17		PGTW
9	211022	22.7N 124.0E	PCN 3		DMSD17		RKSO
10	211254	22.4N 124.0E	PCN 3		DMSD14	PSN BASED ON CR BANDS	PGTW
11	211516	22.9N 124.7E	PCN 5		DMSD14		RODN
12	211516	23.2N 124.8E	PCN 5		DMSD17		PGTW
13	212121	24.1N 132.0E	PCN 5	T1.5/2.5 /#1.0/21HRS	DMSD17		PGTW
14	212121	24.4N 131.5E	PCN 5	T2.0/2.0	DMSD17	INIT JMS/UPR 1VL	RPMK
15	240000	24.4N 132.7E	PCN 5		DMSD14		PGTW
16	240216	25.4N 131.1E	PCN 3		DMSD14		PGTW
17	240216	25.1N 131.8E	PCN 3	T1.0/1.0	DMSD14	INIT JMS	RKSO
18	241000	27.7N 134.0E	PCN 5		DMSD17		PGTW
19	241002	24.0N 134.7E	PCN 5		DMSD17		RODN
20	241002	27.1N 134.0E	PCN 5		DMSD17		RKSO

## RAJAR FIXES

FIX NO.	TIME (Z)	FIX POSITION	HADAR	ACRY	EYE SHAPE	EYE DIAM	RAJHOB-CODE ASMAN TDOFF	COMMENTS	HADAR POSITION	SITE VMO NO.
1	210200	22.2N 124.1E	LAND				21022 50511		24.8N 125.3E	47927
2	210200	22.2N 124.1E	LAND				10023 50710		24.3N 124.2E	47910
3	210400	22.3N 124.7E	LAND				21012 50914		24.8N 125.3E	47927
4	210400	22.3N 124.7E	LAND				20042 50812		24.3N 124.2E	47910
5	210500	22.4N 124.0E	LAND				10072 50810		24.8N 125.3E	47927
6	210500	22.4N 124.0E	LAND				15/41 50814		24.3N 124.2E	47910
7	210500	22.4N 124.2E	LAND				22012 50814		24.8N 125.3E	47927
8	210500	22.4N 124.2E	LAND				20701 50911		24.3N 124.2E	47910
9	210700	22.5N 124.6E	LAND				24042 50822		24.8N 125.3E	47927
10	210900	22.5N 124.9E	LAND				24011 50810		24.8N 125.3E	47927
11	211500	23.4N 124.5E	LAND				1/111 40522		26.1N 127.7E	47927

## SYNOPTIC FIXES

FIX NO.	TIME (Z)	FIX POSITION	INTENSITY ESTIMATE	NEAREST DATA (NM)	COMMENTS
1	210000	19.0N 114.0E	15	60	
2	211200	20.0N 114.0E	15	60	

TYPHOON ELLIE

SATELLITE FIXES

FLA NO.	TIME (Z)	FIX POSITION	ACQRY	ORBITAL CODE	SATELLITE	COMMENTS	SITE
1	240019	9.3N 130.3E	PCN 5	T0.0/0.0	DWSP1A	INIT JDS	PGTW
2	241119	9.0N 141.7E	PCN 5		DWSP1A		PGTW
3	241441	8.9N 139.0E	PCN 6		DWSP1A		PGTW
4	270001	9.0N 140.4E	PCN 6	T0.0/0.0 /50.0/24HRC	DWSP1A	POSSIBLE SECONDARY 10.8N 139.4E	PGTW
5	270200	8.7N 140.3E	PCN 6		DWSP1A		PGTW
6	270847	8.6N 139.5E	PCN 5		DWSP1A		PGTW
7	271102	8.7N 139.4E	PCN 6		DWSP1A		PGTW
8	272128	11.3N 139.9E	PCN 6		DWSP1A		PGTW
9	272343	11.4N 139.7E	PCN 5		DWSP1A		PGTW
10	240141	11.4N 139.6E	PCN 5		DWSP1A		PGTW
11	241008	12.1N 139.4E	PCN 6		DWSP1A		PGTW
12	241225	12.9N 139.6E	PCN 6		DWSP1A		PGTW
13	241423	13.2N 139.7E	PCN 6		DWSP1A		PGTW
14	242325	12.5N 139.0E	PCN 5	T0.0/0.0 /50.0/24HRC	DWSP1A		PGTW
15	241208	12.9N 139.6E	PCN 6		DWSP1A		PGTW
16	242307	13.7N 139.2E	PCN 5	T0.0/0.0 /50.0/24HRC	DWSP1A		PGTW
17	341150	13.7N 139.6E			DWSP1A		PGTW
18	341346	13.9N 139.3E	PCN 6		DWSP1A		PGTW
19	342208	13.7N 139.7E	PCN 5	T1.0/1.0 /01.0/21HRC	DWSP1A		PGTW
20	010031	13.5N 139.4E	PCN 6		DWSP1A		PGTW
21	010227	13.2N 131.5E	PCN 5		DWSP1A		PGTW
22	010227	12.9N 131.3E	PCN 5	T2.0/2.0	DWSP1A	INIT JDS	RPWK
23	011050	13.7N 131.0E	PCN 5		DWSP1A	CI UP	PGTW
24	011050	13.9N 130.9E	PCN 6		DWSP1A	UPR LVL MITFION	RODN
25	011313	13.9N 130.7E	PCN 6		DWSP1A		PGTW
26	011313	13.7N 130.7E	PCN 6		DWSP1A		RODN
27	011509	13.9N 130.2E	PCN 6		DWSP1A		PGTW
28	011509	13.6N 130.1E	PCN 5		DWSP1A	UPR LVL ANTI/RAMMING	RPWK
29	012148	14.7N 129.1E	PCN 5		DWSP1A		PGTW
30	050013	14.5N 129.4E	PCN 5	T3.0/3.0 /02.0/24HRC	DWSP1A		RODN
31	050137	14.6N 129.0E	PCN 1	T4.5/4.5 /00.5/24HRC	DWSP1A		RPWK
32	050155	14.1N 129.3E	PCN 5		DWSP1A		PGTW
33	050209	14.5N 129.1E	PCN 3		DWSP1A		RPWK
34	050509	14.5N 129.5E	PCN 5		DWSP1A		RODN
35	050209	14.6N 129.1E	PCN 3	T4.0/4.0	DWSP1A	INIT JDS	RODN
36	051029	15.0N 127.1E	PCN 4		DWSP1A	CI UP	PGTW
37	051255	15.1N 126.6E	PCN 6		DWSP1A		PGTW
38	051450	15.1N 126.6E	PCN 5		DWSP1A		RPWK
39	051451	15.3N 126.4E	PCN 5		DWSP1A		PGTW
40	052128	15.9N 125.0E	PCN 5		DWSP1A		RPWK
41	052129	15.3N 125.3E	PCN 5	T4.0/4.0 /01.0/21HRC	DWSP1A		PGTW
42	052356	16.0N 124.0E	PCN 5		DWSP1A		PGTW
43	050137	14.2N 124.9E	PCN 1	T5.0/5.0 /02.0/24HRC	DWSP1A		RPWK
44	051009	17.4N 123.4E	PCN 6		DWSP1A		PGTW
45	051237	17.4N 122.9E	PCN 6		DWSP1A		PGTW
46	051432	19.1N 122.6E	PCN 6		DWSP1A		PGTW
47	051432	14.1N 123.1E	PCN 6		DWSP1A		RPWK
48	052249	19.6N 110.5E	PCN 3	T4.4/3.5 /01.0/21HRC	DWSP1A		RODN
49	052249	14.7N 121.5E	PCN 5	T3.0/4.0 /02.0/21HRC	DWSP1A		RPWK
50	040300	18.3N 120.6E	PCN 5		DWSP1A		RPWK
51	040314	19.5N 120.4E	PCN 3		DWSP1A	EXPUSEU ILCC	RODN
52	041131	19.9N 110.4E	PCN 4		DWSP1A		RODN
53	041555	20.1N 119.0E	PCN 3		DWSP1A		RPWK
54	041555	20.2N 119.1E	PCN 3		DWSP1A	EXPUSEU ILCC NF OF DENSE CONV	RODN
55	042230	20.1N 114.3E	PCN 5	T3.4/3.5 /00.5/24HRC	DWSP1A		RPWK
56	040101	20.0N 114.0E	PCN 3		DWSP1A		RPWK
57	050255	20.1N 114.8E	PCN 3		DWSP1A		RODN
58	050256	20.2N 114.9E	PCN 3	T4.5/4.5 /01.0/24HRC	DWSP1A		RODN
59	041110	20.4N 114.3E	PCN 3		DWSP1A		RODN
60	041110	20.4N 114.5E	PCN 4		DWSP1A	EXPUSEU ILCC	RPWK
61	041343	20.6N 113.7E	PCN 3		DWSP1A	WELL DEFINED ILCC	RODN
62	041537	20.7N 113.7E	PCN 3		DWSP1A		RPWK
63	042210	21.7N 111.0E	PCN 5		DWSP1A	N/A DUE TO TERMINATOR	PGTW
64	042210	21.5N 111.7E	PCN 5		DWSP1A		RPWK
65	040043	21.5N 111.4E	PCN 5	T2.5/2.5 /02.4/24HRC	DWSP1A		RODN
66	040237	21.4N 110.0E	PCN 5		DWSP1A		RKSO

# AIRCRAFT FIXES

FIX NO.	TIME (Z)	FIX POSITION	FLT LVL	TU0041 HGT	DBS MSLP	MAX-SFC-WND VEL/ARG/ANG	MAX-FLT-LVL-WND DTW/VEL/DRG/ANG	ACFTRY NAV/MPT	EYE SHAPE	EYE ORIENT- DIAM/TATION	EYE TEMP (C) DUT/ LV/ DP/SET	ASN NO.
1	302003	11.3N 112.4E	700MM	7084	1000		140 19 040 30	R 12				3
2	302202	11.3N 112.3E	700MM	7085	1000	40 270 15	140 32 080 60	R 3			+12 +10 +10	3
3	011339	11.3N 120.1E	700MM	2444	984		140 55 070 60	N 5			+13 +13	4
4	012150	14.1N 120.1E	700MM	2451	981	35 180 15	240 60 180 15	N 5	CIRCULAR	40	+18 +19 + 9	4
5	020539	14.1N 127.7E	700MM	2857		55 020 40	100 95 020 35	N 5			+17 +12	5
6	020915	14.7N 127.4E	700MM	2858	974	50 120 20	040 62 310 45	N 5	ELLIPTICAL	35 25 100	+11 +17 +12	5
7	021933	14.7N 126.6E	700MM	2739	971		210 74 130 60	N 5			+15 +10	6
8	022157	14.7N 126.3E	700MM	2724	955	100 130 20	230 32 130 20	N 5	ELLIPTICAL	30 20 090	+14 +17 +10	6
9	030544	14.3N 124.1E	700MM	2750	961	40 030 40	110 98 030 40	N 6			+18 +14	7
10	030906	17.3N 127.9E	700MM	2731	956	50 150 50	040 88 360 30	N 6	ELLIPTICAL	30 20 070	+15 +19 +14	7
11	040952	19.5N 110.4E	700MM	2979	984	70 100 5	200 50 160 20	2 1			+18 +17	9
12	042156	20.2N 114.7E	700MM	3011	982	75 150 10	140 62 240 10	2 2			+13 +13 + 9	10

# NAVAL FIXES

FIX NO.	TIME (Z)	FIX POSITION	NADAR	ACFTRY	EYE SHAPE	EYE DIAM	WIND-COUE ASWAS DUOFF	COMMENTS	NADAR POSITION	SITE WND NO.
1	030500	14.3N 127.6E	LAND					PROBABLY EYE	14.1N 123.0E	08440
2	030700	17.0N 124.0E	LAND				41111 51111	SPIRAL OVERLAY	16.3N 120.6E	08321
3	031400	17.9N 123.5E	LAND				11111 52911		16.3N 120.6E	08321
4	031500	17.9N 123.1E	LAND				34421 62911		16.3N 120.6E	08321
5	031600	14.4N 122.5E	LAND				34411 52920		16.3N 120.6E	08321
6	040000	14.0N 121.3E	LAND				34451 52712		16.3N 120.6E	08321
7	040100	14.0N 121.2E	LAND				10001 79997	EYE 75 PERCENT CIRCULAR	16.3N 120.6E	08321
8	040200	14.3N 120.5E	LAND				10011 79997	EYE FIXED CIRCULAR OPEN 44	16.3N 120.6E	08321
9	040500	14.4N 120.2E	LAND				41111 51111		16.3N 120.6E	08321
10	040500	19.5N 110.7E	LAND				45111 51111		22.3N 114.2E	45005
11	040510	20.7N 114.3E	LAND				45011 72810		22.3N 114.2E	45005
12	041700	21.0N 113.2E	LAND				45011 72810		22.3N 114.2E	45005
13	041930	21.2N 112.5E	LAND				45011 72810		22.3N 114.2E	45005
14	042100	21.5N 112.3E	LAND				45011 72810		22.3N 114.2E	45005

# SYNOPTIC FIXES

FIX NO.	TIME (Z)	FIX POSITION	INTENSITY ESTIMATE	NEAREST DATA (NM)	COMMENTS
1	240000	7.0N 141.0E	15	150	
2	241200	7.0N 140.0E	15	120	
3	270500	14.4N 134.3E	20	100	
4	280000	12.0N 134.0E	15	60	BRN43 F-W THOUGH
5	281200	14.0N 134.5E	20	100	BRN43 F-W THOUGH
6	300000	11.5N 131.5E	25	140	BRN43 F-W THOUGH
7	300500	14.0N 132.0E	25	150	BRN43 F-W THOUGH

## TROPICAL STORM FAYE

## SATELLITE FIXES

FIX NO.	TIME (Z)	FIX POSITION	ACCR	DVDRK CODE	SATELLITE	COMMENTS	SITE
1	202307	2.0N 152.3E	PCN 5	T0.0/0.0	DMSP34	INIT JDS	PGTW
2	201346	3.6N 151.7E	PCN 6		DMSP34		PGTW
3	202247	5.6N 151.1E	PCN 5	T1.0/1.0 /01.0/24HRS	DMSP34		PGTW
4	010908	5.7N 150.2E	PCN 6		DMSP37	CI SAME	PGTW
5	011132	6.1N 150.0E	PCN 6		DMSP34		PGTW
6	011328	6.6N 149.7E	PCN 6		DMSP34		PGTW
7	012007	6.3N 147.3E	PCN 6		DMSP37		PGTW
8	020209	7.6N 146.2E	PCN 5	T2.0/2.0 /01.0/27HRS	DMSP34		PGTW
9	020948	7.9N 145.0E	PCN 6		DMSP37	CI SAME	PGTW
10	021114	7.9N 144.4E	PCN 5		DMSP34		PGTW
11	021309	8.0N 144.5E	PCN 6		DMSP34		PGTW
12	022128	9.0N 143.6E	PCN 5	T3.0/3.0	DMSP37	INIT JDS	PGTW
13	022129	9.2N 142.9E	PCN 6		DMSP37		PGTW
14	022356	9.6N 142.5E	PCN 5		DMSP34		PGTW
15	021009	9.3N 140.7E	PCN 6		DMSP37	EDGE OF DATA	PGTW
16	021055	9.7N 140.3E	PCN 6		DMSP34	EDGE OF DATA	PGTW
17	021432	10.0N 139.6E	PCN 6		DMSP34		PGTW
18	021432	10.0N 140.1E	PCN 6		DMSP34		PGTW
19	022109	10.6N 139.3E	PCN 5	T3.0/3.0 /50.0/24HRS	DMSP37		PGTW
20	022338	10.3N 139.3E	PCN 5		DMSP34		PGTW
21	040118	10.3N 139.4E		T4.0/4.0 /01.0/24HRS	DMSP34		PGTW
22	040132	10.5N 139.5E	PCN 3		DMSP34	EXPUSED ILCC	PGTW
23	040132	10.6N 140.2E	PCN 4	T3.0/3.0	DMSP34	INIT JDS	PGTW
24	040949	10.6N 139.7E	PCN 6		DMSP37		PGTW
25	041219	10.6N 138.1E	PCN 4		DMSP34		PGTW
26	041413	10.7N 137.1E	PCN 6		DMSP34		PGTW
27	041414	10.5N 136.7E	PCN 5		DMSP34		PGTW
28	042048	10.3N 136.0E	PCN 6		DMSP37	UPR LVL CNTR 10.5N 135.0E	PGTW
29	042320	10.5N 136.5E	PCN 5		DMSP34		PGTW
30	050114	10.3N 136.9E	PCN 3	T3.0/3.0 /50.0/24HRS	DMSP34		PGTW
31	050114	10.1N 136.1E	PCN 3	T3.0/3.0 /50.0/24HRS	DMSP34		PGTW
32	050928	11.6N 136.0E	PCN 4		DMSP37	EXPUSED ILCC	PGTW
33	051201	11.9N 136.4E	PCN 4		DMSP34	EXPUSED ILCC	PGTW
34	051355	11.9N 136.2E	PCN 4		DMSP34		PGTW
35	051355	12.0N 136.9E	PCN 3		DMSP34	EXPUSED ILCC	PGTW
36	051355	12.3N 136.0E	PCN 4		DMSP34		PGTW
37	052210	12.3N 134.0E	PCN 3	T2.0/3.0 /41.0/21HRS	DMSP37		PGTW
38	062302	13.1N 133.7E	PCN 3		DMSP34		PGTW
39	060237	13.7N 133.4E	PCN 3		DMSP34		PGTW
40	060237	13.6N 133.3E	PCN 3	T2.0/3.0 /41.0/25HRS	DMSP34		PGTW
41	060309	15.0N 132.4E	PCN 6		DMSP37		PGTW
42	061144	15.2N 132.0E	PCN 4		DMSP34		PGTW
43	061518	15.6N 131.5E	PCN 4		DMSP34		PGTW
44	061519	15.6N 131.3E	PCN 3		DMSP34		PGTW
45	070026	17.3N 129.6E	PCN 3	T0.0/1.0 /42.0/24HRS	DMSP34		PGTW
46	071308	17.7N 127.2E	PCN 6		DMSP34	CI UP	PGTW
47	080008	19.6N 126.4E	PCN 5	T0.0/0.0 /50.0/24HRS	DMSP34		PGTW
48	081250	20.2N 126.3E	PCN 5		DMSP34		PGTW

## ATCRAFT FIXES

FIX NO.	TIME (Z)	FIX POSITION	FLT LVL	70043 MGT	DBS MSLP	MAX-SFC-WND VEL/DIR/RNG	MAX-FLY-LVL-WND DIR/VEL/DIR/RNG	ACCR NAV/MET	EYE SHAPE	EYE ORIENTATION	EYE TEMP (C) DIR/ INW DP/SGT	USN NO.
1	012300	6.1N 146.5E	1500FT		1008							1
2	020852	7.6N 145.5E	1500FT		1004	20 120 45 280	20 160 30 2	5				2
3	020845	7.6N 145.3E	1500FT		1004	25 200 50 280	25 200 100 4	5				3
4	021309	8.0N 144.5E	700MM	1094								4
5	022050	9.0N 143.6E	1500FT		1001	40 270 15 280	30 300 60 4	2				5
6	040910	9.5N 141.6E	700MM	1084	998	45 270 40 360	55 270 40 4	7				6
7	042014	10.1N 140.6E	700MM	1085	998	50 170 30 140	46 040 70 4	3				7
8	040804	10.5N 138.5E	700MM	1097	1001	50 180 45 110	55 050 50 4	5				8
9	042122	10.2N 136.0E	700MM	1033	991	45 170 15 060	40 320 120 3	3	ELLIPTICAL	5 13 090		9
10	050804	11.3N 136.4E	1500FT		994	30 240 10 230	30 140 7 4	4				10
11	051925	11.6N 136.6E	700MM	1100		220	33 130 60 4	5				11
12	052200	12.6N 137.3E	1500FT		1004	10 180 140 230	40 180 140 4	10				12
13	060717	13.9N 137.7E	1500FT		1001							13
14	070534	16.0N 127.5E	700MM	1117		10 090 70 170	20 090 70 4	5				14

## SYNOPTIC FIXES

FIX NO.	TIME (Z)	FIX POSITION	INTENSITY ESTIMATE	WFAREAST DATA (MM)	COMMENTS
1	201200	3.0N 155.0E	15	150	EQUATORIAL DOUBLE-VORTICE INTERACTION
2	200000	2.5N 154.0E	15	80	EQUATORIAL DOUBLE-VORTICE INTERACTION
3	201200	3.0N 151.5E	15	130	EST 451P 1000MM
4	200000	3.5N 151.0E	15	90	EST 451P 1000MM
5	201200	4.0N 152.0E	15	150	SFC TRF MW-SE

## TROPICAL DEPRESSION 08

## SATELLITE FIXES

FIX NO.	TIME (Z)	FIX POSITION	ACQRY	UVN2AK CODE	SATFILLITE	COMMENTS	SITE
1	202339	5.3W 134.4E	PCN 5	T0.0/0.0	DMSD1A	INIT OBS	PGTH
2	211220	7.3W 134.5E	PCN 5		DMSD1A	CI 5446/11PR 1VI	PGTH
3	221202	11.5W 130.8E	PCN 6		DMSD1A		PGTH
4	222302	14.4W 130.6E	PCN 5	T1.0/1.0	DMSD1A	INIT OBS/LLC 735N 1407E	PGTH
5	231012	20.2W 130.4E	PCN 6		DMSD1A		PGTH
6	241144	20.3W 130.9E	PCN 6		DMSD1A		PGTH
7	241303	20.5W 130.7E	PCN 6		DMSD1A		PGTH
8	241328	20.5W 130.6E	PCN 5		DMSD1A		PGTH
9	242111	22.0W 137.0E	PCN 5	T1.0/1.0 /50.0/27HRC	DMSD1A		PGTH
10	242245	22.4W 134.6E	PCN 5		DMSD1A		PGTH
11	240145	23.2W 134.1E	PCN 5		DMSD1A		PGTH
12	240209	23.4W 134.5E	PCN 5	T1.0/1.0	DMSD1A	INIT OBS	PGTH
13	240210	23.7W 134.8E	PCN 5		DMSD1A		PGTH
14	240951	24.4W 134.0E	PCN 5		DMSD1A		PGTH
15	241244	24.9W 131.0E	PCN 6		DMSD1A		PGTH
16	241307	24.3W 131.5E	PCN 6		DMSD1A		PGTH
17	241451	25.2W 132.9E	PCN 5		DMSD1A		PGTH
18	241451	25.0W 131.0E	PCN 5		DMSD1A	INIT NIGHTTIME OBS	ROON
19	240008	25.4W 130.9E	PCN 5	T0.0/1.0 /W1.0/27HRC	DMSD1A	POSSIBLE SECONDARY 27.0W 130.3E	PGTH
20	240126	26.2W 130.4E	PCN 5		DMSD1A		PGTH
21	240151	26.4W 130.1E	PCN 5		DMSD1A		PGTH
22	240151	26.4W 129.0E	PCN 5	T1.0/1.0	DMSD1A	INIT OBS	ROON
23	241226	30.7W 127.0E	PCN 5		DMSD1A		PGTH
24	241250	30.7W 127.5E	PCN 5		DMSD1A		PGTH
25	241433	30.4W 127.4E	PCN 5		DMSD1A		PGTH
26	242350	31.4W 124.7E	PCN 5	T4.0/4.0	DMSD1A	INIT OBS	AKSO
27	242350	31.0W 124.5E	PCN 5	T2.0/2.0-/D2.0/24HRC	DMSD1A		PGTH
28	240133	32.4W 124.4E	PCN 5		DMSD1A		PGTH
29	240314	32.4W 124.3E	PCN 3		DMSD1A		AKSO

## AIRCRAFT FIXES

FIX NO.	TIME (Z)	FIX POSITION	FLT LVL	Y0043 OBS MGT	MSLP	MAX-SFC-WND VEL/HRG/RWG	MAX-FLT-LVL-WND WIND/VEL/HRG/RWG	ACQRY NAV/WFT	EYE SHAPE	EYE ORIEN- TION/TATION	KYC TEMP (C) DUTY /W/ DP/KCT	WSN NO.
1	241016	21.1W 133.5E	700MB	1127	1004	15 110 120	140 15 060 10	2 10			10 + 3 + 8	1

## SYNOPSIS FIXES

FIX NO.	TIME (Z)	FIX POSITION	INTENSITY ESTIMATE	NEAREST DATA (NM)	COMMENTS
1	240000	21.5W 134.0E	15	60	
2	241200	21.5W 133.0E	20	60	
3	240000	24.5W 130.0E	20	60	
4	241200	24.0W 127.5E	20	60	
5	240000	31.0W 124.5E	15	60	
6	241200	31.0W 124.0E	15	60	
7	270000	34.0W 124.0E	14	60	

SUPER TYPHOON HOPE

CATELITE FIXES

FLA NO.	TIME (Z)	FLA POSITION	ACFRY	UVZAR CODE	SATellite	COMMENTS	SITE
1	240151	10.5N 144.2E	PCN 5	T1.0/1.0	DWSP74	INIT JMS	
2	240152	10.5N 144.4E	PCN 6		DWSP77		PGTW
3	241108	10.3N 142.7E	PCN 5		DWSP74		PGTW
4	241226	10.6N 142.6E	PCN 5		DWSP79		PGTW
5	241433	11.2N 147.1E	PCN 6		DWSP74		PGTW
6	242350	11.6N 148.8E	PCN 6	T1.0/1.0 /50.0/2PHRE	DWSP74		PGTW
7	240107	11.6N 148.5E	PCN 5		DWSP70		PGTW
8	240133	11.5N 148.5E	PCN 5		DWSP74		PGTW
9	240133	11.7N 148.1E	PCN 6	T1.0/1.0-	DWSP74	INIT JMS	RODM
10	240912	12.0N 148.0E	PCN 5		DWSP77		PGTW
11	241207	12.0N 130.4E	PCN 6		DWSP74		PGTW
12	241232	12.0N 130.4E	PCN 6		DWSP74		PGTW
13	241414	11.3N 130.5E	PCN 5		DWSP74		PGTW
14	241414	11.3N 140.4E	PCN 5		DWSP74	INIT NIGHTTIME DMS	PGTW
15	240808	11.6N 140.7E	PCN 3		DWSP74		APMK
16	240114	13.6N 140.5E	PCN 5	T0.0/1.0 /W1.0/24HRE	DWSP74		PGTW
17	240114	13.6N 140.6E	PCN 5	T1.0/1.0 /W1.0/24HRE	DWSP74		RODM
18	240551	14.7N 140.3E	PCN 6		DWSP77		PGTW
19	240217	14.7N 134.0E	PCN 3	T1.0/1.0 /O1.0/24HRE	DWSP74	EXPUSED ILCC	PGTW
20	240237	17.2N 134.5E	PCN 6		DWSP74		PGTW
21	240102	16.2N 137.4E	PCN 5		DWSP77	BASED ON HPR 1VL	PGTW
22	240103	17.7N 137.4E	PCN 5		DWSP77		APMK
23	241156	14.0N 137.4E	PCN 6		DWSP74		PGTW
24	241310	14.3N 136.3E	PCN 4		DWSP74		PGTW
25	241337	14.6N 136.4E	PCN 6		DWSP74		APMK
26	240212	17.1N 134.2E	PCN 7	T2.0/2.0 /O1.0/2PHRE	DWSP77		PGTW
27	242257	14.6N 136.7E	PCN 5		DWSP74		PGTW
28	240151	14.6N 136.9E	PCN 5	T3.0/3.0	DWSP70	INIT JMS	PGTW
29	240219	14.1N 136.7E	PCN 5		DWSP74		APMK
30	240219	14.2N 136.6E	PCN 5	T3.0/3.0	DWSP74		PGTW
31	240138	14.5N 134.1E	PCN 6		DWSP74	INIT JMS	RODM
32	241252	14.7N 134.9E	PCN 5		DWSP70	CI UP	PGTW
33	240150	14.2N 134.7E	PCN 6		DWSP74		PGTW
34	240150	14.7N 134.7E	PCN 6		DWSP74		PGTW
35	300014	14.6N 131.3E	PCN 3		DWSP74		RODM
36	300020	14.7N 131.4E	PCN 5	T4.0/4.0 /O2.0/21HRE	DWSP74		RODM
37	300132	14.6N 131.4E	PCN 3	T4.0/4.0 /O1.0/24HRE	DWSP70		PGTW
38	300133	14.7N 131.3E	PCN 3		DWSP74		APMK
39	300201	14.6N 131.3E	PCN 1	T4.5/4.5 /O1.5/24HRE	DWSP74		PGTW
40	300201	14.9N 131.2E	PCN 2		DWSP74		RODM
41	300932	17.0N 130.1E	PCN 3		DWSP77		PGTW
42	301233	17.7N 131.6E	PCN 3		DWSP70		PGTW
43	301233	17.4N 132.0E	PCN 3		DWSP70		RODM
44	301301	17.2N 131.7E	PCN 4		DWSP70		PGTW
45	301441	17.7N 131.3E	PCN 1		DWSP74		PGTW
46	301442	17.7N 131.4E	PCN 1		DWSP77		PGTW
47	302213	14.5N 120.7E	PCN 1	T5.5/5.5 /O1.5/21HRE	DWSP77		AKSO
48	302213	14.5N 120.5E	PCN 3	T5.0/5.0 /O1.0/2PHRE	DWSP77		APMK
49	310002	14.4N 120.3E	PCN 1		DWSP74		PGTW
50	310114	14.4N 120.9E	PCN 1		DWSP79		PGTW
51	311053	14.3N 124.6E	PCN 2		DWSP77		PGTW
52	311244	14.7N 124.9E	PCN 1		DWSP74		PGTW
53	311355	14.7N 124.9E	PCN 2		DWSP70		PGTW
54	311355	14.7N 124.6E	PCN 1		DWSP70		APMK
55	311423	14.4N 124.5E	PCN 1		DWSP74		RODM
56	311424	14.4N 124.7E	PCN 1		DWSP74		PGTW
57	312153	20.5N 121.7E	PCN 1	T6.5/6.5 /O1.5/24HRE	DWSP77		RODM
58	312153	20.5N 121.7E	PCN 1	T6.5/6.5 /O1.0/24HRE	DWSP77		PGTW
59	312153	20.5N 121.7E	PCN 1	T6.5/6.5	DWSP77	INIT JMS	APMK
60	312344	20.6N 121.3E	PCN 1		DWSP74		RODM
61	010236	20.7N 122.6E	PCN 1		DWSP70		PGTW
62	010236	20.4N 122.4E	PCN 1		DWSP70		APMK
63	011033	21.3N 120.6E	PCN 2		DWSP77		RODM
64	011336	21.4N 119.5E	PCN 1		DWSP70		PGTW
65	011336	21.4N 119.6E	PCN 1		DWSP70		PGTW
66	011336	21.5N 119.5E	PCN 1		DWSP70		APMK
67	011408	21.4N 119.5E	PCN 1		DWSP70		RODM
68	011547	21.7N 118.6E	PCN 1		DWSP74		APMK
69	012314	22.0N 117.1E	PCN 1	T5.5/6.5 /W1.0/24HRE	DWSP74		RODM
70	020217	22.4N 115.7E	PCN 1	T5.0/5.5 /W1.5/24HRE	DWSP70		APMK
71	020247	22.1N 115.3E	PCN 1		DWSP74		PGTW
72	020247	22.3N 115.3E	PCN 1	T5.0/6.0 /W1.5/24HRE	DWSP74		PGTW
73	021155	22.4N 112.4E	PCN 4		DWSP77		RODM
74	021155	22.7N 111.1E	PCN 3		DWSP77		APMK
75	021528	22.7N 110.8E	PCN 4		DWSP74		RODM
76	021528	22.7N 107.9E	PCN 6		DWSP74		PGTW
77	022254	21.4N 109.4E	PCN 5	T3.5/4.5 /W1.5/24HRE	DWSP77		APMK
78	022254	22.4N 108.8E	PCN 5	T2.0/2.0	DWSP77	INIT JMS	RODM

# ATCRAFT FIXES

FIX NO.	TIME (Z)	FIX POSITION	FLT IFL	70043 HGT	385 MSLP	MAX-SFC-WND VEL/ARG/RWS	MAX-FLT-LVL-WND DIR/VEL/ANG/ANG NAV/MET	ACCRV NAV/MET	EYE SHAPE	EYE ORIENTATION	EYE TEMP (C) DIR/10/3P/5KT	WSN NO.	
1	240328	10.4N 144.5E	1500F1		1005	25 110 120	070 38 310 120	4 10			+25 +23 23	1	
2	240413	11.2N 147.4E	1500F1	1003	1000	25 050 50	140 28 070 40	4 10			+25 +21 28	2	
3	240509	11.4N 141.7E	700MM	1001	1000	15 050 30	140 31 050 90	3 25			+11 + 9	3	
4	240513	11.4N 141.3E	700MM	1001	1002	15 130 100	140 17 130 120	4 25			+12 +13 + 9	3	
5	241830	12.3N 139.8E	700MM	1008			270 50 300 30				+10 + 7	4	
6	242025	12.5N 140.0E	1500F1			10 080 50	170 30 210 30	10 10			+25 +23	4	
7	272307	14.1N 137.9E	700MM	1096	999	50 120 15	140 30 120 15	4 4			+12 +11	28	5
8	241933	14.3N 134.7E	700MM	1052			110 41 070 120	4 5			+17 + 9	6	6
9	242052	14.7N 134.7E	700MM	1047	905	40 100 30	140 49 270 20	4 2			+11 +13 +10	6	6
10	240715	14.6N 134.5E	700MM	1065		75 140 20	040 50 310 30	4 1			+15 +10	7	7
11	240320	14.6N 134.2E	700MM	1064	972	70 130 20	170 72 040 30	2 1	CIRCULAR	8	+18 +17 +10	7	7
12	241808	14.7N 134.1E	700MM	1074	965		220 68 110 10	4 3			+15 +15	8	8
13	240331	14.4N 137.8E	700MM	1045	961	40 360 30	040 75 360 20	4 1	ELLIPTICAL	5 3 340	+13 +15 +15	8	8
14	300515	17.1N 132.7E	700MM	1056		85 090 15	170 45 090 15	4 5			+19 +13	9	9
15	300925	17.1N 132.4E	700MM	1009	934	95 170 12	270 80 170 12	1 1	ELLIPTICAL	8 6 160	+17 +15 +15	10	10
16	301339	14.2N 130.2E	700MM			40 220 50	010 75 300 25	2 5	ELLIPTICAL	10 8 140	+11 +15 +16	10	10
17	302225	14.6N 129.7E	700MM	1047	926	45 140 5	170 110 030 15	4 2	ELLIPTICAL	10 8 140	+11 +15 +16	10	10
18	310648	14.3N 127.4E	700MM	1021	912	95 360 20	040 130 360 15	4 7	CIRCULAR	15	+15 +16	11	11
19	310410	14.6N 124.9E	700MM	1025	998	100 360 10	120 147 020 10	4 5	CIRCULAR	14	+12 +27 +12	11	11
20	312148	20.5N 127.7E	700MM	1023	902	140 110 20	140 134 110 20	4 4	CIRCULAR	20	+18 +20 +17	12	12
21	010745	21.0N 121.1E	700MM	1065	917	95 060 30	140 120 200 20	4 1	CIRCULAR	14	+16 +15 +16	13	13
22	010906	21.2N 120.8E	700MM	1081	920	100 060 20	140 86 240 50	4 1	CIRCULAR	16	+19 +17 +17	13	13

## RAJAN FIXES

FIX NO.	TIME (Z)	FIX POSITION	NAVAR	ACCRV	EYE SHAPE	EYE DIAM	RAJAN-CODE ASWAVE TOWFF	COMMENTS	NAVAR POSITION	SITE WMO NO.
1	010000	20.5N 121.0E	LAND				715/1 ////		14.2N 122.7E	08731
2	010100	20.7N 122.9E	LAND				5		25.1N 121.0E	46406
3	010150	20.7N 122.5E	LAND				715/1 53023		14.2N 122.7E	08731
4	010300	20.5N 122.2E	LAND				707/1 52716		14.2N 122.7E	08731
5	010350	20.7N 122.0E	LAND				707/1 52914		14.2N 122.7E	08731
6	010500	20.5N 121.0E	LAND				5		22.0N 120.3E	46744
7	010500	20.5N 121.0E	LAND				354/1 52519		14.2N 122.7E	08731
8	010500	20.7N 122.0E	LAND				5		20.0N 121.0E	46406
9	010550	20.5N 121.5E	LAND				5		14.2N 122.7E	08731
10	010600	20.4N 121.8E	LAND				5		24.0N 121.0E	46406
11	010600	20.7N 121.8E	LAND				5		22.0N 120.3E	46744
12	010600	21.0N 121.8E	LAND				5		25.1N 121.0E	46406
13	010650	20.7N 121.3E	LAND				754/1 52912		14.2N 122.7E	08731
14	010700	20.4N 121.5E	LAND				5		22.0N 120.3E	46744
15	010700	21.1N 121.5E	LAND				5		24.0N 121.0E	46406
16	010700	22.5N 121.6E	LAND				5		25.1N 121.0E	46406
17	010900	21.2N 121.3E	LAND				5		24.0N 121.0E	46406
18	010930	20.4N 120.8E	LAND				7//// ////	SPIRAL OVERLAY IS DEARRPES	10.3N 120.6E	08371
19	010930	21.2N 121.0E	LAND				5		22.0N 120.3E	46744
20	010930	21.1N 120.2E	LAND				5		22.0N 120.3E	46744
21	010930	21.3N 120.4E	LAND				5		25.1N 121.0E	46406
22	010930	20.4N 120.2E	LAND				4//// ////	SPIRAL OVERLAY IS DEARRPES	10.3N 120.6E	08371
23	011000	21.2N 120.4E	LAND				5		24.0N 121.0E	46406
24	011000	21.3N 120.7E	LAND				5		22.0N 120.3E	46744
25	011200	21.5N 120.1E	LAND				5		22.0N 120.3E	46744
26	011300	21.4N 119.7E	LAND				5		22.0N 120.3E	46744
27	011400	21.4N 119.4E	LAND				5		22.0N 120.3E	46744
28	011500	21.4N 119.0E	LAND				5		22.0N 120.3E	46744
29	011600	21.7N 118.7E	LAND				5		22.0N 120.3E	46744
30	011700	21.7N 118.4E	LAND				5		22.0N 120.3E	46744
31	011900	21.7N 118.1E	LAND				5		22.0N 120.3E	46744
32	011440	21.3N 119.1E	LAND				5		22.0N 120.3E	46744
33	011900	21.7N 117.9E	LAND				4		24.0N 121.0E	46406
34	012000	21.7N 117.7E	LAND				5		22.0N 120.3E	46744
35	012100	21.4N 117.4E	LAND				5		22.0N 120.3E	46744
36	012100	21.4N 117.5E	LAND				5		22.0N 120.3E	46744
37	020100	22.3N 114.2E	LAND				10303 ////		22.3N 114.2E	45085
38	020100	22.5N 114.1E	LAND				//// ////		22.3N 114.2E	45085
39	020200	22.4N 114.7E	LAND				24/// 53032		22.0N 120.3E	46744
40	020300	22.4N 114.2E	LAND				//// ////		22.3N 114.2E	45085
41	020300	22.4N 114.2E	LAND				//// ////		22.3N 114.2E	45085
42	020400	22.5N 114.0E	LAND						22.3N 114.2E	45085
43	020400	22.4N 114.0E	LAND						22.3N 114.2E	45085
44	020500	22.4N 114.3E	LAND						22.3N 114.2E	45085

## SYNOPTIC FIXES

FIX NO.	TIME (Z)	FIX POSITION	INTENSITY ESTIMATE	NEAREST DATA (NM)	COMMENTS
1	241200	10.5N 147.0E	15	100	

## TROPICAL STORM GORDON

## SATELLITE FIXES

FIA NO.	TIME (Z)	FIX POSITION	ACFRY	UNUSAK CODE	SATELLITE	COMMENTS	SITE
1	240932	11.2N 134.1E	PCV 6		DMSP47	INIT NIGHTTIME OBS	PGTW
2	241225	11.2N 133.7E	PCV 5		DMSP46		PGTW
3	241250	11.1N 133.6E	PCV 5		DMSP46		PGTW
4	241433	11.1N 134.3E	PCV 5		DMSP46		PGTW
5	242212	11.2N 134.3E	PCV 5	11.0/1.0	DMSP47		PGTW
6	242300	11.2N 134.3E	PCV 5		DMSP46		PGTW
7	240107	11.3N 134.4E	PCV 5		DMSP40		PGTW
8	240133	11.3N 134.1E	PCV 5		DMSP46		PGTW
9	240133	11.2N 134.4E	PCV 5	12.0/2.0	DMSP46	INIT OBS	ROOM
10	241232	11.1N 134.4E	PCV 5		DMSP46	CI UP	PGTW
11	241346	11.2N 134.2E	PCV 5		DMSP46		PGTW
12	241414	11.2N 134.4E	PCV 5		DMSP46		PGTW
13	242332	11.2N 134.3E	PCV 3	12.0/2.0 / 01.0/25HRS	DMSP46		PGTW
14	270230	11.2N 134.2E	PCV 3	12.0/2.0	DMSP46	INIT OBS	ROOM
15	270255	11.2N 134.0E	PCV 5		DMSP46	PARTIALLY EXPOSED LLCC	ROOM
16	270255	11.2N 134.2E	PCV 3	12.0/2.0	DMSP46	INIT OBS	ROOM
17	270256	11.2N 134.7E	PCV 5	13.0/3.0 / 01.0/25HRS	DMSP46		PGTW
18	271033	11.2N 134.7E	PCV 5		DMSP46	CI UP	PGTW
19	271329	11.2N 134.6E	PCV 3		DMSP46		PGTW
20	271537	11.2N 134.4E	PCV 5		DMSP46		ROOM
21	271537	11.2N 134.1E	PCV 5		DMSP46		ROOM
22	280056	11.2N 134.7E	PCV 3	14.0/4.0 / 01.0/25HRS	DMSP46		ROOM
23	240211	11.2N 134.4E	PCV 1		DMSP47		PGTW
24	240237	11.2N 134.2E	PCV 1	14.0/4.0 / 02.0/24HRS	DMSP46	REMOVING TYPE FVE	PGTW
25	240237	11.2N 134.4E	PCV 1	13.5/3.5 / 01.5/24HRS	DMSP46		ROOM
26	241013	11.2N 134.7E	PCV 5		DMSP47	CI SAME	PGTW
27	241310	11.2N 134.4E	PCV 5		DMSP46		PGTW
28	241310	11.2N 134.4E	PCV 5		DMSP46		ROOM
29	241338	11.2N 134.4E	PCV 5		DMSP46		ROOM
30	241319	11.2N 134.4E	PCV 5		DMSP46		PGTW
31	242253	11.2N 134.4E	PCV 5	12.5/3.5 / 01.5/25HRS	DMSP47		ROOM
32	242253	11.2N 134.6E	PCV 5	13.0/3.0	DMSP47	INIT OBS	ROOM
33	240038	11.2N 134.7E	PCV 1	14.0/4.0 / 01.0/25HRS	DMSP46		ROOM
34	240151	11.2N 134.4E	PCV 1		DMSP46		ROOM
35	240219	11.2N 134.4E	PCV 1	13.0/3.0 / 01.0/25HRS	DMSP46		ROOM
36	240219	11.2N 134.4E	PCV 1		DMSP46		ROOM
37	241136	11.2N 134.4E	PCV 5		DMSP47		ROOM
38	241136	11.2N 134.4E	PCV 5		DMSP47		ROOM
39	241319	11.2N 134.1E	PCV 3		DMSP46		ROOM
40	241320	11.2N 134.1E	PCV 5		DMSP46	CI UUDN	ROOM

## ATCRAFT FIXES

FIA NO.	TIME (Z)	FIX POSITION	FLT LVL	UNUSAK CODE	OBS	MAX-SFC-WND VEL/DIR/MB	MAX-FLY-LVL-FW DTM/VEL/MB/MB	ACFRY NAV/MT	EYE SHAPE	EYE ORIENTATION	WIND TEMP (C) DIR / 100 DP/SET	WIND NO.
1	240927	11.2N 134.7E	1500FT	700MM	3005	397	30 050 20	120 45 050 20	4	14	+25 +25 +25 29	2
2	242036	11.2N 134.7E	700MM	700MM	3005	394	50 120 30	080 35 320 0N	4	3	+13 +13 +13	3
3	242152	11.2N 134.4E	700MM	700MM	3005	394	50 130 40	070 40 330 35	4	2	+12 +12 +12	4
4	270910	11.2N 134.4E	700MM	700MM	3005	391	40 020 50	110 54 020 120	4	4	+11 +11 +11	5
5	271336	11.2N 134.4E	700MM	700MM	3005	393	50 110 51	040 20 4	2	4	+14 +14 +14	5
7	272152	11.2N 134.4E	700MM	700MM	3005	391	50 040 30	140 53 040 30	0	2	+11 +11 +11	5
8	241050	11.2N 134.4E	700MM	700MM	3005	375	45 150 30	200 45 140 120	2	4	+11 +11 +11	6
									CIRCULAR ELLIPTICAL	5 00 25 010		

## RAVAN FIXES

FIA NO.	TIME (Z)	FIX POSITION	WIND	ACFRY	EYE SHAPE	EYE DIAM	WIND-CODE	WIND-TIME	COMMENTS	WIND POSITION	SITE
1	272250	11.2N 134.4E	LA-0							25.1N 121.6E	66400
2	240200	11.2N 134.7E	LA-0							25.1N 121.6E	66400
3	240300	11.2N 134.1E	LA-0							25.1N 121.6E	66400
4	240400	11.2N 134.1E	LA-0							22.0N 120.3E	66744
5	240500	11.2N 134.1E	LA-0							22.0N 120.3E	66744
6	240700	11.2N 134.4E	LA-0							22.0N 120.3E	66744
7	240900	11.2N 134.7E	LA-0							22.0N 120.3E	66744
8	240900	11.2N 134.6E	LA-0							22.0N 120.3E	66744
9	241000	11.2N 134.4E	LA-0							22.0N 120.3E	66744
10	241100	11.2N 134.4E	LA-0							22.0N 120.3E	66744
11	241200	11.2N 134.3E	LA-0							22.0N 120.3E	66744
12	241300	11.2N 134.0E	LA-0							22.0N 120.3E	66744
13	241400	11.2N 134.7E	LA-0							22.0N 120.3E	66744
14	241500	11.2N 134.4E	LA-0							22.0N 120.3E	66744
15	241500	11.2N 134.0E	LA-0							22.0N 120.3E	66744
16	241700	11.2N 134.4E	LA-0							22.0N 120.3E	66744
17	241800	11.2N 134.4E	LA-0							22.0N 120.3E	66744
18	241900	11.2N 134.4E	LA-0							22.0N 120.3E	66744
19	242000	11.2N 134.1E	LA-0							22.0N 120.3E	66744
20	242100	11.2N 134.4E	LA-0							22.0N 120.3E	66744
21	240000	11.2N 134.7E	LA-0							22.0N 120.3E	66744
22	240300	11.2N 134.4E	LA-0							22.0N 120.3E	66744
23	240500	11.2N 134.4E	LA-0							22.0N 120.3E	66744
24	240600	11.2N 134.4E	LA-0							22.0N 120.3E	66744
25	241020	11.2N 134.4E	LA-0							22.0N 120.3E	66744

## TROPICAL DEPRESSION 11

## CATELITIF FIXES

FIA NO.	TIME (Z)	FIX POSITION	ACRY	DOZAK CODE	SATFILLITE	COMMENTS	SITE
1	021317	12.1N 134.3E	PCN 6		DWSP30	INIT NIGHTTIME OBS	PGTW
2	020220	11.4N 131.2E	PCN 5	TU-1/0.0	DWSP34	INIT OBS	PGTW
3	020953	13.9N 130.4E	PCN 6		DWSP37		PGTW
4	020953	14.5N 131.0E	PCN 6		DWSP37		RPMK
5	021150	14.2N 130.2E	PCN 6		DWSP34		PGTW
6	021258	14.4N 130.3E	PCN 5		DWSP30		PGTW
7	021510	13.3N 128.9E	PCN 5		DWSP35		RODN
8	021510	14.9N 130.3E	PCN 6		DWSP34		PGTW
9	040032	15.0N 127.7E	PCN 5	T0.0/0.0 /50.0/22HRC	DWSP34		PGTW
10	040139	15.7N 128.1E	PCN 5		DWSP30		PGTW
11	040210	15.2N 128.1E	PCN 5	T0.0/0.0	DWSP34	INIT OBS	RODN
12	040210	15.4N 128.1E	PCN 5		DWSP35		PGTW
13	040933	14.9N 127.0E	PCN 6		DWSP37		PGTW
14	041239	14.4N 128.3E	PCN 5		DWSP34		PGTW
15	041314	14.5N 128.3E	PCN 5		DWSP34		PGTW
16	041451	14.5N 128.0E	PCN 5		DWSP34		PGTW
17	041451	14.2N 125.9E	PCN 5		DWSP35		RPMK
18	042214	17.9N 126.2E	PCN 5		DWSP37		PGTW
19	040014	17.7N 127.8E	PCN 5	T2.0/2.0 /02.0/24HRC	DWSP34		PGTW
20	040120	17.7N 128.0E	PCN 3		DWSP34		PGTW
21	040151	17.3N 128.0E	PCN 3		DWSP35		PGTW
22	040151	18.0N 128.9E	PCN 5	T1.0/1.0+/01.0/24HRC	DWSP34		RODN
23	041256	14.9N 128.2E	PCN 3		DWSP34	EXPUSEU I LCC	PGTW
24	041402	12.2N 125.2E	PCN 6		DWSP34		RODN
25	041433	14.0N 125.8E	PCN 3		DWSP35		PGTW
26	042153	14.9N 127.8E	PCN 5	T2.0/2.0 /50.0/22HRC	DWSP37	INIT OBS	RPMK
27	042153	19.3N 121.6E	PCN 5	T1.0/1.0	DWSP37		PGTW
28	042356	14.5N 122.9E	PCN 5		DWSP34		RODN
29	040243	19.3N 121.5E	PCN 5	T1.0/1.0 /50.0/25HRC	DWSP34		RODN
30	040314	19.3N 121.4E	PCN 5		DWSP35		RODN
31	040314	19.3N 121.5E	PCN 5		DWSP35		RPMK
32	041034	21.1N 122.0E	PCN 5	T0.0/0.0	DWSP37	INIT OBS	RKSO
33	041317	21.0N 119.6E	PCN 5		DWSP30		RODN

## AIRCRAFT FIXES

FIX NO.	TIME (Z)	FIX POSITION	FLI LVL	TU042 HGT	OBS MSLP	MAX-GFC-WND VEL/ARG/RNG	MAX-FLT-LVL-WND DTW/VEL/BMG/KMG	ACRY NAV/MET	EYE SHAPE	EYE ORIENTATION	WV TEMP (C) DIR/1W DP/5KT	WSN NO.
1	020615	14.0N 127.1E	700MH	1090	1003	10 230	48 220	15 060 48	5 5		+11 + 9 28	2
2	022200	14.7N 129.9E	700MH	1070	1004	15 150	50 040	12 330 10	5 5		+15 + 8 28	2
3	042126	17.3N 127.6E	1500FT		1001	30 180	60 220	30 180 35	4 15		+25 +23 28	4
4	040915	14.0N 125.9E	1500FT		997	25 060	50 110	25 060 60	5 5		+25 +25	5
5	042130	14.9N 122.8E	700MH	1090	1001		240	25 150 10	7 10			6
6	042222	14.3N 121.4E	1500FT		1007	20 360	4 040	15 330 5	4 2		+25 +25 27	6

## SYNOPTIC FIXES

FIA NO.	TIME (Z)	FIX POSITION	INTENSITY ESTIMATE	VFAREST DATA (MM)	COMMENTS
1	020600	12.0N 136.0E	15	120	
2	040600	20.7N 121.9E	15	30	

TYPHOON IRVING  
SATELLITE FIXES

FILE NO.	TIME (Z)	STA POSITION	ACQRY	UNIQUE CODE	SATELLITE	COMMENTS	SITE
1	071220	14.1N 137.9E	PCN 6		DMC07A		PGTW
2	090023	14.1N 137.1E	PCN 6	T0.0/0.0	DMC07A	INIT JDS	PGTW
3	091202	14.4N 137.9E	PCN 3		DMC07A		PGTW
4	092303	17.7N 136.6E	PCN 5	T1.0/1.0 /01.0/23HRC	DMC07A		PGTW
5	092219	17.9N 136.9E	PCN 5		DMC07A		PGTW
6	090933	14.3N 135.5E	PCN 6		DMC07A		PGTW
7	091144	14.3N 134.3E	PCN 3		DMC07A		PGTW
8	091500	17.4N 134.6E	PCN 3		DMC07A		PGTW
9	091500	17.7N 134.6E	PCN 3		DMC07A		PGTW
10	091500	17.7N 134.6E	PCN 3		DMC07A		PGTW
11	092214	14.4N 137.3E	PCN 4		DMC07A		PGTW
12	100026	14.4N 137.2E	PCN 3	T1.0/1.0 /50.0/25HRC	DMC07A		PGTW
13	100127	14.4N 137.1E	PCN 3		DMC07A		PGTW
14	100127	14.4N 137.1E	PCN 3	T1.0/1.0	DMC07A	INIT JDS	PGTW
15	100913	14.3N 137.0E	PCN 6		DMC07A		PGTW
16	100913	14.4N 137.2E	PCN 6		DMC07A		PGTW
17	101226	14.3N 131.4E	PCN 3		DMC07A		PGTW
18	101307	17.5N 131.4E	PCN 6		DMC07A		PGTW
19	101642	14.1N 129.0E	PCN 5		DMC07A		PGTW
20	101642	14.3N 130.2E	PCN 5		DMC07A		PGTW
21	101642	17.3N 130.1E	PCN 3		DMC07A		PGTW
22	102154	17.4N 129.6E	PCN 3		DMC07A		PGTW
23	102154	17.4N 129.6E	PCN 5	T1.0/1.0	DMC07A	INIT JDS	PGTW
24	110004	14.7N 129.7E	PCN 5	T2.0/2.0 /01.0/24HRC	DMC07A		PGTW
25	110108	14.7N 129.6E	PCN 5		DMC07A		PGTW
26	110142	14.4N 129.4E	PCN 5		DMC07A		PGTW
27	110142	14.7N 129.6E	PCN 6		DMC07A		PGTW
28	111034	14.4N 129.5E	PCN 6		DMC07A		PGTW
29	111250	17.1N 129.2E	PCN 5		DMC07A		PGTW
30	111349	17.2N 129.2E	PCN 6		DMC07A		PGTW
31	111423	17.3N 129.3E	PCN 5		DMC07A		PGTW
32	111423	17.1N 130.6E	PCN 5		DMC07A		PGTW
33	112134	17.5N 129.1E	PCN 5	T4.5/2.5 /01.5/24HRC	DMC07A		PGTW
34	112134	17.3N 129.7E	PCN 5		DMC07A		PGTW
35	112351	17.4N 127.6E	PCN 3	T3.0/3.0 /01.0/24HRC	DMC07A	INIT JDS	PGTW
36	120230	17.4N 127.7E	PCN 5	T3.0/3.0	DMC07A		PGTW
37	120230	17.7N 127.0E	PCN 5		DMC07A		PGTW
38	120305	17.4N 127.6E	PCN 5		DMC07A		PGTW
39	121015	14.7N 127.0E	PCN 5		DMC07A	CI UP	PGTW
40	121232	14.7N 126.7E	PCN 5		DMC07A		PGTW
41	121340	14.4N 126.3E	PCN 6		DMC07A		PGTW
42	121340	17.9N 126.6E	PCN 5		DMC07A		PGTW
43	121537	14.4N 126.3E	PCN 5		DMC07A		PGTW
44	122116	14.3N 126.7E	PCN 5		DMC07A		PGTW
45	122333	20.0N 127.1E	PCN 5	T4.5/4.5 /01.5/24HRC	DMC07A		PGTW
46	130211	20.0N 126.9E	PCN 3	T4.0/4.0 /01.0/24HRC	DMC07A		PGTW
47	130211	20.0N 127.0E	PCN 3	T4.0/4.0 /01.5/24HRC	DMC07A		PGTW
48	130247	20.3N 126.4E	PCN 3		DMC07A		PGTW
49	130247	20.7N 127.0E	PCN 3		DMC07A		PGTW
50	130354	21.4N 126.4E	PCN 4		DMC07A		PGTW
51	130354	21.4N 126.7E	PCN 6		DMC07A		PGTW
52	131214	22.1N 125.9E	PCN 5		DMC07A		PGTW
53	131311	22.3N 125.4E	PCN 5		DMC07A		PGTW
54	131528	22.4N 125.4E	PCN 3		DMC07A		PGTW
55	131528	22.7N 125.4E	PCN 5		DMC07A		PGTW
56	132234	23.6N 125.1E	PCN 5	T3.0/5.0 /01.0/21HRC	DMC07A		PGTW
57	132235	23.0N 125.1E	PCN 5		DMC07A		PGTW
58	140056	23.3N 124.0E	PCN 5		DMC07A		PGTW
59	140152	23.3N 125.1E	PCN 1	T4.5/4.5 /00.5/24HRC	DMC07A		PGTW
60	140152	23.4N 124.9E	PCN 3	T5.0/4.0 /00.5/24HRC	DMC07A		PGTW
61	140152	23.7N 125.1E	PCN 3	T4.5/4.5	DMC07A	INIT JDS	PGTW
62	140228	23.4N 124.9E	PCN 1		DMC07A		PGTW
63	140228	23.4N 125.0E	PCN 1		DMC07A		PGTW
64	141115	24.7N 125.0E	PCN 2		DMC07A		PGTW
65	141116	24.5N 124.7E	PCN 2		DMC07A		PGTW
66	141252	24.7N 124.4E	PCN 1		DMC07A		PGTW
67	141252	24.5N 124.6E	PCN 3		DMC07A		PGTW
68	141348	24.5N 124.5E	PCN 2		DMC07A		PGTW
69	141510	24.4N 124.5E	PCN 3		DMC07A		PGTW
70	142214	24.4N 124.8E	PCN 1	T5.5/4.5 /00.5/24HRC	DMC07A		PGTW
71	142215	24.4N 124.7E	PCN 1		DMC07A		PGTW
72	140038	25.4N 124.4E	PCN 3	T4.0/4.0 /00.5/21HRC	DMC07A		PGTW
73	140039	24.4N 124.4E	PCN 3	T5.0/4.0 /00.5/21HRC	DMC07A		PGTW
74	140133	24.4N 124.6E	PCN 3	T5.0/4.0 /50.0/24HRC	DMC07A		PGTW
75	140209	24.7N 124.7E	PCN 3		DMC07A		PGTW
76	140210	24.6N 124.4E	PCN 3		DMC07A		PGTW
77	140210	24.7N 124.3E	PCN 3		DMC07A		PGTW
78	141055	27.2N 123.8E	PCN 1		DMC07A		PGTW
79	141055	27.2N 123.8E	PCN 2		DMC07A	PSN BADEN ON FVF	PGTW
80	141233	27.5N 123.7E	PCN 1		DMC07A		PGTW
81	141233	27.6N 123.6E	PCN 1		DMC07A		PGTW
82	141314	27.5N 123.7E	PCN 1		DMC07A		PGTW
83	141320	27.5N 123.9E	PCN 1		DMC07A		PGTW
84	141451	24.1N 124.0E	PCN 3		DMC07A		PGTW
85	141451	27.3N 123.8E	PCN 3		DMC07A		PGTW

85	140134	29.1N	121.4E	PCN 1	T5.0/5.0-740.0/24HRS	DMSP17	
87	140155	29.2N	121.7E	PCN 1	T5.0/5.5 /40.5/24HRS	DMSP17	PGTW
88	140200	29.7N	121.9E	PCN 1		DMSP17	RPMK
89	140139	31.4N	121.7E	PCN 2		DMSP17	PGTW
90	140151	30.1N	121.7E	PCN 1		DMSP17	PGTW
91	140151	30.1N	121.5E	PCN 1	T5.0/5.0 /01.0/24HRS	DMSP17	PGTW
92	140256	30.2N	121.7E	PCN 1	T5.0/5.0 /50.0/24HRS	DMSP10	RK50
93	140256	30.1N	121.6E	PCN 1		DMSP10	RODM
94	141035	31.3N	121.7E	PCN 1		DMSP17	RK50
95	141035	31.6N	121.7E	PCN 1		DMSP17	RPMK
96	141302	31.7N	121.8E	PCN 3		DMSP17	RK50
97	141302	31.7N	121.8E	PCN 3		DMSP17	PGTW
98	141356	32.5N	124.0E	PCN 3		DMSP17	RK50
99	141431	32.2N	121.9E	PCN 3		DMSP17	RODM
100	141432	32.2N	121.7E	PCN 3		DMSP17	PGTW
101	141433	32.2N	121.8E	PCN 3		DMSP17	RPMK
102	142134	33.5N	124.9E	PCN 3	T3.0/4.0-742.0/20HRS	DMSP17	RK50
103	142135	33.5N	124.6E	PCN 3		DMSP17	RK50
104	170002	33.9N	125.4E	PCN 3	T4.5/5.5 /40.5/21HRS	DMSP17	RODM
105	170002	34.1N	125.2E	PCN 3		DMSP17	RK50
106	170132	34.2N	125.7E	PCN 3	T3.0/4.0-742.0/27HRS	DMSP17	PGTW
107	170132	34.3N	124.7E	PCN 3		DMSP17	RK50
108	170226	34.5N	124.9E	PCN 3		DMSP17	RK50
109	170237	34.4N	124.9E	PCN 3		DMSP17	RPMK
110	171015	34.4N	124.3E	PCN 3		DMSP17	RK50
111	171015	34.5N	124.2E	PCN 3		DMSP17	PGTW
112	171015	34.4N	124.3E	PCN 3		DMSP17	RPMK
113	171244	37.3N	129.1E	PCN 3		DMSP17	RK50
114	171244	37.6N	129.0E	PCN 3		DMSP17	PGTW
115	171337	37.4N	129.8E	PCN 3		DMSP17	RPMK
116	171337	37.7N	130.0E	PCN 3		DMSP17	RK50
117	171555	34.5N	130.9E	PCN 5		DMSP17	PGTW
118	171556	34.5N	131.1E	PCN 5		DMSP17	RPMK
119	172114	41.5N	131.1E	PCN 5	T2.5/3.5 /42.0/23HRS	DMSP17	RK50
120	172114	41.5N	131.9E	PCN 5	T1.5/2.5 /41.5/24HRS	DMSP17	RPMK
121	172345	41.9N	131.5E	PCN 5		DMSP17	RK50
122	180114	43.5N	134.5E	PCN 5		DMSP17	RPMK
123	180218	42.9N	134.6E	PCN 5		DMSP17	RK50
124	180218	44.0N	135.1E	PCN 5		DMSP17	RPMK

#### ATCRAFT FIXES

FIX NO.	TIME (Z)	FIX POSITION	FLT I/VL	70043 HGT	OBS MSPL	MAX-SFC-WVD VEL/ARG/RNG	MAX-FL1-LVL-4000 DTW/VEL/DNU/400	ACCRV NAV/MFT	EYE SHAPE	EYE ORIEN- DIAM/TATION	EYE TEMP (C) OUT/ IN/ DP/5CT	WSN NO.
1	090008	17.4N 134.0E	1500FT	1077	996	45 220 35	740 15 220 20	3 1				1
2	090928	14.1N 134.5E	1500FT	1037	994	20 100 35	100 30 100 35	4 4				2
3	091926	17.4N 134.6E	700MM	1074	998	20 270 70	140 33 090 120	6 10				3
4	092122	14.3N 131.8E	1500FT		998	20 270 70	140 33 090 120	6 10				3
5	100716	14.1N 131.6E	700MM	1067		30 030 10	120 15 030 10	2 4				4
6	100914	14.4N 131.8E	700MM	1066	994	30 330 20	110 17 330 15	2 4				4
7	102207	17.4N 129.2E	1500FT	1065	996	30 210 50	110 30 050 120	5 5				5
8	110512	16.4N 124.6E	700MM	1014	992	45 290 150	140 31 290 400	5 3				6
9	110912	17.7N 129.2E	700MM	994	988	25 290 30	020 28 290 120	2 4				6
10	111316	17.3N 124.4E	700MM	992	989	50 190 120	140 45 090 60	4 10				7
11	112145	17.5N 129.3E	700MM	985	985	50 190 120	140 45 090 60	4 10				7
12	120716	14.5N 127.2E	700MM	907	379	55 280 55	140 48 280 65	2 4				8
13	120918	14.5N 127.0E	700MM	904	380	55 110 35	020 60 310 90	2 4				8
14	121944	14.3N 127.2E	700MM	870	375		140 45 050 120	2 4				8
15	122222	14.7N 124.4E	700MM	880	975	65 130 120	210 65 130 135	4 4				9
16	130644	21.2N 124.7E	700MM	843	972	70 020 120	140 61 020 110	5 1				10
17	130908	21.5N 124.7E	700MM	833	969	75 130 30	070 52 330 100	4 2				10
18	131912	21.0N 124.1E	700MM	774	964		220 53 130 60	4 4				11
19	142149	21.2N 124.3E	700MM	770	960	70 230 30	200 56 230 90	4 4				11
20	140500	24.0N 124.4E	700MM	732	959	65 260 30	120 68 030 60	1 1				12
21	140950	24.2N 124.4E	700MM	717	954	75 130 150	210 63 140 40	1 4	CIRCULAR	30		12
22	142143	24.5N 124.4E	700MM	705	956		140 75 100 30	1 2	CIRCULAR	30		13
23	140520	27.0N 124.7E	700MM	711	957		220 65 120 140	10 5				14
24	140905	27.1N 121.9E	700MM	700	956	60 020 120	110 65 020 60	10 5	CIRCULAR	20		14
25	142151	24.2N 124.4E	700MM			60 150 20	220 61 150 30					15

#### DATA FIXES

FIX NO.	TIME (Z)	FIX POSITION	MAJAC	ACCRV	EYE SHAPE	EYE DIAM	WIND-VECT-4000 DTW/VEL/DNU/400	COMMENTS	MAJAC POSITION	WIND NO.
1	131500	22.4N 124.4E	LAND				41112 11111		24.3N 124.2E	47918
2	131700	23.0N 124.4E	LAND				41112 43011		24.3N 124.2E	47918
3	131730	24.7N 124.3E	LAND	PTUM				EYE MAJAC 3315	24.3N 124.3E	47918
4	131900	23.0N 124.1E	LAND				41112 52016		24.3N 124.2E	47918
5	131900	23.0N 124.1E	LAND				41112 51111		24.3N 124.3E	47918
6	131900	21.2N 124.3E	LAND				41112 51111		24.3N 124.3E	47918
7	131900	22.4N 124.1E	LAND				41112 51111		24.3N 124.2E	47918
8	132000	21.2N 124.3E	LAND				41112 73105		24.3N 124.2E	47918
9	132000	21.2N 124.3E	LAND				41112 52008		24.3N 124.3E	47918
10	132030	21.2N 124.3E	LAND						24.3N 124.3E	47918
11	132100	21.2N 124.1E	LAND				41112 52805		24.3N 124.3E	47918
12	132100	21.2N 124.3E	LAND				41112 11111		24.3N 124.3E	47918
13	132200	21.3N 124.2E	LAND				41112 53308		24.3N 124.2E	47918
14	132200	21.1N 124.1E	LAND				41112 51805		24.3N 124.2E	47918
15	132200	21.2N 124.3E	LAND	PTUM				EYE MAJAC 0614	24.3N 124.3E	47918
16	132300	21.1N 124.0E	LAND				41112 53314		24.3N 124.3E	47918
17	132300	21.4N 124.2E	LAND				41112 73404		24.3N 124.3E	47918
18	132300	21.4N 124.1E	LAND	PTUM				EYE MAJAC 3115	24.3N 124.3E	47918

19	100000	21.6W	124.0E	LAND	P70H	EN	5/112 52911	EVE MNUA 3115	24.0N	125.3E	47997
20	100000	21.6W	124.0E	LAND			7/114 50000		24.3N	124.2E	47918
21	100000	21.3W	124.0E	LAND					24.0N	125.3E	47997
22	100000	21.3W	124.0E	LAND	P70H	EN		EVE MNUA 3220	24.0N	125.3E	47997
23	100100	21.5W	124.0E	LAND	P70H	EN		EVE MNUA 3215	24.0N	125.3E	47997
24	100100	21.5W	124.0E	LAND			7/114 53215		24.0N	125.3E	47997
25	100100	21.5W	124.0E	LAND			6/112 53108		24.3N	124.2E	47918
26	100100	21.5W	124.0E	LAND			6/113 05210		24.0N	121.0E	46600
27	100200	21.5W	124.0E	LAND	P70H	EN		EVE STNR	24.0N	125.3E	47997
28	100200	21.6W	124.0E	LAND			6/112 52511		24.3N	124.2E	47918
29	100200	21.6W	124.0E	LAND			6/114 52705		24.0N	125.3E	47997
30	100200	21.6W	124.0E	LAND			7/114 52421		24.0N	121.0E	46600
31	100300	21.6W	124.0E	LAND			6/114 50415		24.0N	125.3E	47997
32	100300	21.6W	124.0E	LAND			6/112 72905		24.3N	124.2E	47918
33	100300	21.7W	124.0E	LAND			7/114 50120		24.0N	121.0E	46600
34	100400	21.9W	124.0E	LAND			7/114 50103		24.0N	121.0E	46600
35	100400	21.7W	124.0E	LAND			6/112 50315		24.0N	121.0E	46600
36	100400	21.9W	124.0E	LAND			6/114 50200		24.3N	124.2E	47918
37	100500	24.2W	124.0E	LAND			7/114 53420		24.0N	125.3E	47997
38	100500	24.0W	124.0E	LAND			6/113 53514		24.0N	125.3E	47997
39	100500	21.3W	124.0E	LAND			6/112 53611		24.3N	124.2E	47918
40	100500	24.3W	124.0E	LAND			7/114 53407		24.0N	121.0E	46600
41	100500	24.1W	124.0E	LAND			6/113 50308		24.0N	125.3E	47997
42	100500	24.1W	124.0E	LAND	G70U	EN		EVE MNUA 3335	24.0N	125.3E	47997
43	100500	24.1W	124.0E	LAND			6/112 73612		24.3N	124.2E	47918
44	100700	24.1W	124.0E	LAND			7/113 52714		24.0N	125.3E	47997
45	100700	24.2W	124.0E	LAND	G70U	EN		EVE MNUA 3205	24.0N	125.3E	47997
46	100700	24.2W	124.0E	LAND			10004 52407		24.0N	121.0E	46600
47	100700	24.1W	124.0E	LAND			6/112 73315		24.3N	124.2E	47918
48	100900	24.1W	124.0E	LAND			11/14 52105		24.0N	121.0E	46600
49	100900	24.1W	124.0E	LAND	G70U	EN		EVE STNR	24.0N	125.3E	47997
50	100900	24.1W	124.0E	LAND			6/112 73305		24.3N	124.2E	47918
51	100400	24.1W	124.0E	LAND			6/113 50000		24.0N	125.3E	47997
52	100900	24.3W	124.0E	LAND			7/113 50316		24.0N	125.3E	47997
53	100900	24.2W	124.0E	LAND			6/113 70004		24.3N	124.2E	47918
54	101000	24.6W	124.0E	LAND			7/113 53114		24.0N	125.3E	47997
55	101100	24.5W	124.0E	LAND			6/113 73507		24.3N	124.2E	47918
56	101100	24.5W	124.0E	LAND	FAIR	EN	6/113 63008	EVE MNUA 3220	24.0N	125.3E	47997
57	101100	24.5W	124.0E	LAND			6/113 50108		24.0N	125.3E	47997
58	101200	24.6W	124.0E	LAND			7/113 50108	EVE MNUA 3220	24.0N	125.3E	47997
59	101200	24.6W	124.0E	LAND	FAIR	EN	6/113 73407		24.0N	125.3E	47997
60	101200	24.5W	124.0E	LAND					24.3N	124.2E	47918
61	101200	24.5W	124.0E	LAND					24.0N	125.3E	47997
62	101235	24.1W	124.0E	LAND	P70H	EN		EVE MNUA 3220	24.0N	125.3E	47997
63	101235	24.6W	124.0E	LAND	P70H	EN		EVE MNUA 3220	24.0N	125.3E	47997
64	101300	24.6W	124.0E	LAND	FAIR	EN	7/113 53608		24.0N	121.0E	46600
65	101300	24.6W	124.0E	LAND			6/113 53607		24.0N	125.3E	47997
66	101300	24.7W	124.0E	LAND			6/113 73005		24.3N	124.2E	47918
67	101300	24.6W	124.0E	LAND	P70H	EN		EVE MNUA 3220	24.0N	125.3E	47997
68	101310	24.5W	124.0E	LAND	FAIR	EN	6/113 53605		24.0N	125.3E	47997
69	101400	24.6W	124.0E	LAND	FAIR	EN	6/113 73404		24.0N	125.3E	47997
70	101400	21.9W	124.0E	LAND			6/113 73208		24.3N	124.2E	47918
71	101400	24.7W	124.0E	LAND			6/113 53211		24.0N	125.3E	47997
72	101445	24.6W	124.0E	LAND	P70H	EN	6/113 52705	EVE MNUA 3220	24.0N	125.3E	47997
73	101500	24.6W	124.0E	LAND			7/114 52720		24.0N	121.0E	46600
74	101500	24.6W	124.0E	LAND			6/113 73306		24.3N	124.2E	47918
75	101500	25.1W	124.0E	LAND	FAIR	EN	7/114 53311	EVE MNUA 3610	24.0N	125.3E	47997
76	101600	24.9W	124.0E	LAND			6/112 73407		24.0N	125.3E	47997
77	101600	25.0W	124.0E	LAND	FAIR	EN	6/112 73407	EVE MNUA 3510	24.0N	125.3E	47997
78	101600	24.9W	124.0E	LAND			6/113 53410		24.0N	125.3E	47997
79	101600	25.2W	124.0E	LAND			6/112 73608	EVE MNUA 3610	24.0N	125.3E	47997
80	101700	25.1W	124.0E	LAND	FAIR	EN			24.0N	125.3E	47997
81	101700	25.0W	124.0E	LAND					24.3N	124.2E	47918
82	101700	24.3W	124.0E	LAND	FAIR	EN			24.0N	125.3E	47997
83	101700	25.1W	124.0E	LAND					24.0N	125.3E	47997
84	101800	25.2W	124.0E	LAND					24.3N	124.2E	47918
85	101900	25.2W	124.0E	LAND					24.0N	125.3E	47997
86	101900	25.3W	124.0E	LAND	FAIR	EN			24.0N	125.3E	47997
87	101910	25.1W	124.0E	LAND	FAIR	EN			24.3N	124.2E	47918
88	101935	24.5W	124.0E	LAND	P70H	EN			24.0N	125.3E	47997
89	101900	25.6W	124.0E	LAND			10015 50316	EVE MNUA 3220	24.0N	125.3E	47997
90	101900	25.3W	124.0E	LAND	FAIR	EN		EVE STNR	24.0N	125.3E	47997
91	102000	25.3W	124.0E	LAND	FAIR	EN	7/113 50000		24.0N	125.3E	47997
92	102000	25.3W	124.0E	LAND			6/112 73507		24.0N	125.3E	47997
93	102000	24.6W	124.0E	LAND				P70H CNTR	24.3N	124.2E	47918
94	102010	25.1W	124.0E	LAND	P70H	EN	7/114 50509		24.0N	127.0E	47991
95	102100	25.5W	124.0E	LAND			6/112 73207	EVE MNUA 3610	24.0N	125.3E	47997
96	102100	25.6W	124.0E	LAND			7/113 50508	P70H CNTR	24.0N	125.3E	47997
97	102100	24.6W	124.0E	LAND	FAIR	EN			24.3N	124.2E	47918
98	102100	25.6W	124.0E	LAND					24.0N	125.3E	47997
99	102135	25.5W	124.0E	LAND	P70H	EN	6/113 50607		24.0N	127.0E	47991
100	102200	25.5W	124.0E	LAND			6/113 73303		24.0N	125.3E	47997
101	102200	25.6W	124.0E	LAND			7/114		24.3N	124.2E	47918
102	102200	25.6W	124.0E	LAND				EVE MNUA 3605	24.0N	121.0E	46600
103	102200	25.5W	124.0E	LAND	P70H	EN		P70H CNTR	24.0N	125.3E	47997
104	102210	25.3W	124.0E	LAND	P70H	EN		P70H CNTR	24.3N	124.2E	47918
105	102235	24.3W	124.0E	LAND	P70H	EN			24.0N	127.0E	47991
106	102300	24.5W	124.0E	LAND			6/112 73403		24.3N	124.2E	47918
107	102300	25.7W	124.0E	LAND			6/113 50311		24.0N	125.3E	47997
108	102300	21.9W	124.0E	LAND	P70H	EN		EVE MNUA 3210	24.0N	125.3E	47997
109	102310	25.6W	124.0E	LAND	P70H	EN		P70H CNTR	24.3N	124.2E	47918
110	100000	25.3W	124.0E	LAND	P70H	EN		EVE MNUA 0220	24.0N	125.3E	47997
111	100000	25.9W	124.0E	LAND			6/113 51415		24.0N	125.3E	47997
112	100000	25.4W	124.0E	LAND			6/112 70104		24.3N	124.2E	47918
113	100010	25.5W	124.0E	LAND	P70H	EN		P70H CNTR	24.0N	127.0E	47991

114	150035	24.0N	124.3E	LAND	PHUM	PSHL CNTM	26.4N	127.8E	47991
115	150100	24.0N	124.3E	LAND	PHUM	EVE MNRV 3220	26.3N	125.8E	47995
116	150135	24.2N	124.5E	LAND	PHUM	PSHL CNTM	26.4N	127.8E	47997
117	150200	24.6N	124.5E	LAND		47773 53611	26.4N	125.3E	47997
118	150200	24.2N	124.3E	LAND	PHUM	EVE MNRV 3620	26.3N	125.8E	47999
119	150235	24.6N	124.5E	LAND	PHUM	PSHL CNTM	26.4N	127.8E	47991
120	150300	24.5N	124.4E	LAND		47774 53414	26.4N	125.3E	47997
121	150300	24.6N	124.3E	LAND	PHUM	EVE MNRV 3620	26.3N	125.8E	47999
122	150310	24.7N	124.7E	LAND	PHUM	PSHL CNTM	26.4N	127.8E	47991
123	150500	27.9N	125.0E	LAND	GHUU	EVE MNRV 3120	26.4N	125.3E	47997
124	150600	27.2N	124.9E	LAND		47774 53226	26.4N	125.3E	47997
125	150635	27.7N	124.2E	LAND	PHUM	PSHL CNTM	26.4N	127.8E	47991
126	150700	27.2N	124.1E	LAND	FALM	EVE MNRV 2920	26.3N	125.8E	47999
127	150710	27.9N	124.2E	LAND	PHUM	PSHL CNTM	26.4N	127.8E	47991
128	150735	27.2N	124.0E	LAND	PHUM	PSHL CNTM	26.4N	127.8E	47991
129	150900	27.1N	124.7E	LAND		47773 7290Y	26.4N	125.3E	47997
130	150900	27.2N	124.1E	LAND	FALM	EVE STNR	26.3N	125.8E	47999
131	150900	27.1N	124.1E	LAND		29073 50000	26.4N	125.3E	47997
132	150900	27.2N	124.9E	LAND	FALM	EVE STNR	26.3N	125.8E	47999
133	151000	27.1N	124.1E	LAND		57743 50000	26.4N	125.3E	47997
134	151100	27.3N	124.1E	LAND		57743 5360Y	26.4N	125.3E	47997
135	151100	27.2N	124.1E	LAND	FALM	EVE MNRV 3210	26.3N	125.8E	47999
136	151100	27.9N	124.1E	LAND	FALM	EVE MNRV 3210	26.2N	127.7E	47990
137	151200	27.5N	124.9E	LAND		47774 50211	26.4N	125.3E	47997
138	151200	27.5N	124.7E	LAND	FALM	EVE MNRV 3210	26.3N	125.8E	47999
139	151300	27.5N	124.9E	LAND		47774 50000	26.4N	125.3E	47997
140	151300	27.5N	124.1E	LAND	FALM	EVE MNRV 3610	26.3N	125.8E	47999
141	151400	27.5N	124.9E	LAND		47774 53600	26.4N	125.3E	47997
142	151400	27.3N	124.0E	LAND	GHUU	EVE MNRV 0215	26.3N	125.8E	47999
143	151500	27.3N	124.0E	LAND	GHUU	EVE MNRV 0120	26.3N	125.8E	47999
144	151700	24.3N	124.1E	LAND	GHUU	EVE MNRV 3620	26.3N	125.8E	47999
145	151900	24.5N	124.1E	LAND	PHUM	EVE MNRV 3620	26.3N	125.8E	47999
146	151930	24.3N	124.0E	ACFT		NAV ACCURACY DMN			54824
147	152151	29.2N	124.1E	ACFT					54824
148	152335	25.6N	124.2E	LAND	PHUM	PSHL CNTM	26.4N	127.8E	47991

SUPER TYPHOON JUDY

SATELLITE FIXES

FIX NO.	TIME (Z)	FIX POSITION	ACFR.	JVTRAK CODE	SATELLITE	COMMENTS	SITE
1	151310	13.7N 150.1E	PCN 4		DMSP43		PGTW
2	152239	13.2N 140.4E	PCN 5	T0.0/0.0	DMSP43	INIT JDS	PGTW
3	151120	13.5N 145.4E	PCN 5		DMSP43		PGTW
4	152134	13.1N 144.1E	PCN 5		DMSP43	EDGE OF DATA	PGTW
5	170055	13.3N 143.2E	PCN 5	T3.0/3.0 /03.0/27HRS	DMSP43		PGTW
6	170132	13.3N 142.9E	PCN 6		DMSP43		PGTW
7	170133	14.1N 142.9E	PCN 5	T3.0/3.0	DMSP43	INIT JDS	RPWK
8	171015	13.3N 140.1E	PCN 5		DMSP43		PGTW
9	171155	14.4N 140.3E	PCN 5		DMSP43		PGTW
10	171414	14.8N 140.5E	PCN 5		DMSP43		PGTW
11	171414	14.9N 140.4E	PCN 6		DMSP43		RODN
12	172114	15.1N 139.7E	PCN 6		DMSP43		PGTW
13	172345	15.4N 139.6E	PCN 5	T4.0/4.0 /01.0/27HRS	DMSP43		PGTW
14	172345	15.4N 139.7E	PCN 3	T4.0/4.0	DMSP43	INIT JDS	RODN
15	180036	15.4N 139.5E	PCN 5		DMSP43		PGTW
16	180036	15.5N 139.5E	PCN 5	T4.0/4.0 /01.0/27HRS	DMSP43		RPWK
17	180114	15.4N 139.4E	PCN 5		DMSP43		PGTW
18	180954	16.4N 137.6E	PCN 6		DMSP43		PGTW
19	181226	16.7N 137.1E	PCN 5		DMSP43		PGTW
20	181355	17.1N 137.0E	PCN 5		DMSP43		PGTW
21	181355	16.5N 137.2E	PCN 5		DMSP43		RODN
22	181455	16.7N 137.0E	PCN 5		DMSP43		RPWK
23	182054	17.9N 136.1E	PCN 1		DMSP43		PGTW
24	182327	18.2N 135.1E	PCN 1	T6.0/6.0 /02.0/24HRS	DMSP43		PGTW
25	180159	18.5N 135.6E	PCN 1		DMSP43		PGTW
26	180237	18.4N 135.5E	PCN 1	T6.0/6.0 /01.5/24HRS	DMSP43		RPWK
27	180237	18.5N 135.5E	PCN 1		DMSP43		PGTW
28	180334	18.6N 134.9E	PCN 2		DMSP43		PGTW
29	181209	19.7N 134.0E	PCN 1		DMSP43		PGTW
30	181256	19.8N 134.7E	PCN 1		DMSP43		PGTW
31	181337	20.0N 134.1E	PCN 2		DMSP43		PGTW
32	181519	19.3N 134.7E	PCN 1		DMSP43		RPWK
33	181519	19.7N 134.6E	PCN 1		DMSP43		RODN
34	182034	20.5N 134.4E	PCN 5		DMSP43		PGTW
35	182309	21.3N 133.1E	PCN 1	T5.0/5.0 /01.0/24HRS	DMSP43		PGTW
36	200140	21.4N 133.6E	PCN 1	T7.0/7.0 /01.0/27HRS	DMSP43		RPWK
37	200140	21.5N 133.6E	PCN 1	T8.0/8.0	DMSP43	INIT JDS	RODN

38	200219	21.74	177.4E	PCN 1	040014	ROUN
39	200219	21.74	177.5E	PCN 1	040014	PGTW
40	200219	21.74	177.6E	PCN 1	040014	PGTW
41	201055	22.94	172.4E	PCN 4	040017	RPWK
42	201150	23.14	172.5E	PCN 5	040014	PGTW
43	201239	23.04	172.1E	PCN 5	040014	PGTW
44	201500	22.34	171.4E	PCN 2	040014	RPWK
45	201500	22.34	171.4E	PCN 1	040014	ROUN
46	201500	21.14	171.7E	PCN 1	040014	PGTW
47	202155	21.24	171.6E	PCN 3	13.0/6.0 /W2.0/20HRC	RPWK
48	202155	21.24	171.1E	PCN 3	040017	PGTW
49	210033	21.44	171.1E	PCN 3	13.0/5.0 /W1.0/20HRC	ROUN
50	210033	21.34	171.1E	PCN 3	13.0/5.0 /50.0/25HRC	PGTW
51	210121	21.44	170.4E	PCN 3	040014	ROUN
52	210121	21.44	170.4E	PCN 3	040014	RPWK
53	210121	21.34	170.4E	PCN 3	040014	PGTW
54	210200	21.54	170.4E	PCN 3	040014	PGTW
55	211036	24.34	170.4E	PCN 5	040017	ROUN
56	211036	24.34	170.7E	PCN 4	040017	PGTW
57	211220	24.64	170.6E	PCN 5	040014	PGTW
58	211316	24.54	170.3E	PCN 5	040014	PGTW
59	211441	24.34	170.2E	PCN 2	040014	RPWK
60	211442	24.34	170.2E	PCN 1	040014	ROUN
61	211442	24.74	170.0E	PCN 5	040014	PGTW
62	212135	24.54	170.2E	PCN 1	040017	ROUN
63	212135	24.44	170.1E	PCN 1	13.0/5.0 /50.0/24HRC	RPWK
64	212135	24.44	170.1E	PCN 2	040017	PGTW
65	220015	24.34	177.7E	PCN 3	14.5/5.0 /W0.5/24HRC	ROUN
66	220015	24.64	177.7E	PCN 3	14.5/4.5 /W0.5/24HRC	PGTW
67	220102	24.14	177.4E	PCN 3	040014	ROUN
68	220142	24.14	177.4E	PCN 3	040014	PGTW
69	220243	24.04	177.5E	PCN 3	040014	RPWK
70	220243	24.04	177.4E	PCN 3	040014	ROUN
71	221016	24.54	176.4E	PCN 6	040017	ROUN
72	221016	24.54	177.0E	PCN 6	040017	PGTW
73	221256	24.74	176.7E	PCN 3	040014	PGTW
74	221256	24.74	176.4E	PCN 3	040014	ROUN
75	221343	24.44	176.4E	PCN 4	040014	RPWK
76	221343	24.74	176.4E	PCN 5	040014	RPWK
77	221343	25.04	176.4E	PCN 5	040014	ROUN
78	221423	25.04	176.6E	PCN 5	040014	PGTW
79	222115	25.44	175.4E	PCN 3	040017	PGTW
80	222115	25.54	176.1E	PCN 3	040017	ROUN
81	222115	25.44	175.4E	PCN 2	040017	RPWK
82	222357	25.34	175.8E	PCN 5	040014	RPWK
83	222357	24.44	175.5E	PCN 5	13.0/5.0 /W0.5/24HRC	PGTW
84	230224	24.54	175.2E	PCN 1	13.0/5.0 /50.0/24HRC	RPWK
85	230224	24.44	175.1E	PCN 1	13.0/5.0 /100.0/24HRC	ROUN
86	230224	24.44	175.3E	PCN 1	040014	RPWK
87	230305	24.54	175.1E	PCN 1	040014	RPWK
88	230955	27.24	171.4E	PCN 2	040017	ROUN
89	230955	27.54	171.4E	PCN 2	040017	PGTW
90	230955	27.34	171.0E	PCN 1	040017	RPWK
91	231136	27.34	171.7E	PCN 2	040017	PGTW
92	231238	27.64	171.7E	PCN 1	040014	ROUN
93	231238	27.24	171.7E	PCN 1	040014	RPWK
94	231324	27.44	171.6E	PCN 1	040014	PGTW
95	231324	27.44	171.7E	PCN 1	040014	RPWK
96	231547	27.44	171.3E	PCN 3	040014	RPWK
97	231547	27.54	171.3E	PCN 1	040017	ROUN
98	232236	24.44	171.2E	PCN 2	040017	RPWK
99	232236	24.74	171.0E	PCN 1	040017	ROUN
100	232338	24.54	172.7E	PCN 1	14.0/5.0 /W1.0/24HRC	PGTW
101	240120	24.04	172.1E	PCN 3	040014	RPWK
102	240205	24.04	172.7E	PCN 1	040014	PGTW
103	240205	24.04	172.5E	PCN 1	14.0/5.0 /W1.0/24HRC	RPWK
104	240205	24.04	172.6E	PCN 1	13.0/6.0 /W0.5/24HRC	RPWK
105	240246	24.14	172.6E	PCN 1	040014	RPWK
106	240247	24.14	172.7E	PCN 1	13.0/6.0 /W0.5/24HRC	ROUN
107	241117	24.94	172.6E	PCN 3	040017	RPWK
108	241117	24.74	172.4E	PCN 4	040017	PGTW
109	241305	30.14	172.6E	PCN 3	040014	RPWK
110	241401	30.34	172.4E	PCN 3	040014	RPWK
111	241525	30.24	172.5E	PCN 3	040014	RPWK
112	241528	30.14	172.5E	PCN 3	040014	ROUN
113	242216	30.54	172.9E	PCN 3	13.0/6.0 /W1.0/20HRC	RPWK
114	242216	30.54	172.4E	PCN 3	040017	ROUN
115	240102	30.24	171.0E	PCN 3	14.0/5.0 /W2.0/21HRC	RPWK
116	240146	31.04	171.2E	PCN 3	13.0/6.0 /W1.0/24HRC	PGTW
117	240228	31.04	171.3E	PCN 3	040014	RPWK
118	240228	31.04	171.4E	PCN 3	14.0/5.0 /W2.0/24HRC	ROUN
119	241056	31.44	174.3E	PCN 3	040017	RPWK
120	241056	31.34	174.0E	PCN 3	040017	ROUN
121	241246	32.04	174.4E	PCN 3	040014	RPWK
122	241246	31.74	174.4E	PCN 3	040014	PGTW
123	241344	31.64	174.4E	PCN 3	040014	RPWK
124	241310	31.34	174.4E	PCN 3	040014	PGTW
125	241310	31.44	174.5E	PCN 3	040014	ROUN
126	241310	31.14	174.7E	PCN 3	040014	RPWK
127	242155	32.14	174.4E	PCN 3	12.0/7.0 /W1.0/24HRC	RPWK
128	242156	32.54	174.1E	PCN 3	040017	ROUN
129	240045	32.44	171.5E	PCN 3	040014	RPWK
130	240127	33.64	174.2E	PCN 3	12.0/7.0 /W1.0/24HRC	PGTW
131	240210	32.04	174.4E	PCN 3	12.0/7.0 /W2.0/24HRC	ROUN
132	240210	31.74	174.5E	PCN 3	040014	PGTW
133	240210	32.34	172.7E	PCN 3	12.0/7.0 /W2.0/25HRC	RPWK
134	241036	34.64	170.4E	PCN 4	040017	ROUN
135	241036	31.34	170.1E	PCN 3	040017	RPWK

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INIT JDS

136	241227	34.4N 124.5E	PCN J	DMC034	RKSO
137	241227	34.4N 124.7E	PCN J	DMC034	POTW
138	241325	34.3N 124.7E	PCN B	DMC034	QPMK
139	241451	34.3N 124.0E	PCN B	DMC034	RKSO
140	241451	34.2N 124.0E	PCN B	DMC034	RODM

# ATCRAFT FIXES

FIX NO.	TIME (Z)	FIX POSITION	FLT LVL	THREAT	SBS MSLP	MAX-SFC-WND VEL/4RG/4RG	MAX-FLT-LVL-WND DIR/VEL/4RG/4RG	ACPRY NAV/MET	EYE SHAPE	EYE ORIENT-DTAW/TATION	EYE TEMP (C) DIR/ 1W DP/SET	WSN NO.
1	142341	11.4N 147.5E	700MM	2084	398	35 110	70 090	54 030	14	3 4	+14 +12 +12	2
2	170303	14.0N 142.7E	700MM	2043	395	35 360	15 040	46 350	90	3 10	+11 +11 +11	2
3	170505	14.2N 142.2E	700MM	2024	394	40 090	16 040	46 090	14	5 10	+10 +11 +10	2
4	172048	14.3N 130.5E	700MM	2092	387	70 090	15 170	61 090	10	5 2	+11 +12 +10	26
5	140554	14.3N 130.2E	700MM	2707	956	55 270	10 070	84 260	5	1 3	+15 +11 +11	4
6	140945	14.6N 137.4E	700MM	2717	956	65 320	5 340	90 330	5	2 2	+13 +18 +10	4
7	141932	17.7N 146.3E	700MM	2411	922		340	93 280	5	3 2	+18 +17 +17	5
8	142143	17.9N 136.2E	700MM	2336	314	55 260	12 320	90 260	7	1 1	+14 +23 +18	5
9	141034	19.5N 134.4E	700MM	2295	309		240	92 170	15	4 3	+14 +15 +15	6
10	141921	20.7N 134.3E	700MM	2121	RR9		270	108 160	5	5 2	+34 +18 +18	7
11	142145	21.0N 134.0E	700MM	2091	RR7	70 060	15 340	110 270	5	5 2	+14 +24 +15	7
12	200500	22.1N 133.1E	700MM	2291	908	130 030	3 120	136 030	3	2 2	+18 +18 +18	8
13	240943	27.5N 133.0E	700MM	2380	919	50 280	40 340	110 270	10	2 2	+18 +19 +15	8
14	242259	27.3N 131.2E	700MM	2279	940	100 020	30 020	84 120	14	5 5	+19 +18 +12	9
15	210300	23.5N 130.6E	700MM	2611	945	30 010	10 070	98 010	30	5 10	+18 +19 +14	9
16	210503	24.2N 130.5E	700MM	2613	945	100 360	10 250	75 170	40	10 5	+20 +15 +15	10
17	210942	24.2N 130.2E	700MM	2614	944	100 360	10 340	76 270	30	5 2	+14 +18 +15	10
18	212206	24.2N 129.2E	700MM	2679	952	45 340	20 110	71 360	154	4 2	+16 +16 +16	11
19	250117	24.3N 127.4E	700MM	2679		95 350	15 340	81 260	30	4 2	+19 +16 +16	11
20	250247	24.3N 127.6E	700MM	2684	951	35 030	35 120	78 030	120	4 2	+18 +17 +17	11
21	250550	24.2N 127.3E	700MM	2679	953		120	78 020	143	5 3	+16 +15 +15	12
22	250959	24.1N 127.2E	700MM	2664	949	35 300	15 240	74 220	62	4 5	+14 +15 +15	12
23	251932	24.2N 126.2E	700MM	2634	948		140	91 050	90	2 8	+18 +15 +15	13
24	252200	24.5N 125.4E	700MM	2667	946	55 120	180 75	120 90	3 10		+19 +15 +15	13
25	210500	24.4N 124.3E	700MM	2669	952	55 080	130 120	65 080	15	5 2	+15 +15 +15	14
26	210918	27.1N 124.2E	700MM	2669	950	40 140	140 210	65 140	30	5 5	+16 +16 +15	14

# RAJAW FIXES

FIX NO.	TIME (Z)	FIX POSITION	RAJAW	ACPRY	EYE SHAPE	EYE DIRM	RAJAW-CODE ASWAN TOUFF	COMMENTS	RAJAW POSITION	STP WND NO.
1	141535	17.1N 144.1E	LAND	FAIR				NFG WALL CLD	13.6N 144.9E	01218
2	141710	17.2N 144.9E	LAND	FAIR	ELLIPTICAL			AXIS 10/4	13.6N 144.9E	01218
3	141935	17.5N 144.5E	LAND						13.6N 144.9E	01218
4	142010	17.5N 144.2E	LAND	FAIR	CIRCULAR	35		CNTR OPEN SW-N	13.6N 144.9E	01218
5	142135	17.8N 147.4E	LAND	FAIR	CIRCULAR	30		NFG WALL CLD OPEN SW AND NE	13.6N 144.9E	01218
6	210500	27.6N 130.3E	LAND				308/4 6777		26.1N 127.7E	47997
7	210700	24.0N 130.4E	LAND				308/42 53022		26.1N 127.7E	47997
8	210900	24.0N 130.2E	LAND				3577 52709		26.1N 127.7E	47997
9	210900	24.2N 130.2E	LAND	GROD		40			26.1N 127.7E	47997
10	210900	24.1N 130.1E	LAND				3577 53010		26.1N 127.7E	47997
11	210900	24.1N 130.1E	LAND	GROD		40			26.1N 127.7E	47997
12	211000	24.1N 129.4E	LAND	GROD		36			26.1N 127.7E	47997
13	211100	24.0N 129.4E	LAND				3577 52412	EYE MOVN 2820	26.1N 127.7E	47997
14	211100	24.1N 129.7E	LAND	FAIR		40			26.1N 127.7E	47997
15	211200	24.0N 129.4E	LAND				5777 72611	EYE MOVN 2720	26.1N 127.7E	47997
16	211200	24.1N 129.5E	LAND	FAIR		40			26.1N 127.7E	47997
17	211300	24.0N 129.3E	LAND				5777 72710	EYE MOVN 2720	26.1N 127.7E	47997
18	211300	24.1N 129.4E	LAND			40			26.1N 127.7E	47997
19	211400	24.1N 129.2E	LAND				5777 72707	EYE MOVN 2720	26.1N 127.7E	47997
20	211400	24.1N 129.2E	LAND			40			26.1N 127.7E	47997
21	211500	24.1N 129.1E	LAND				5777 72806	EYE MOVN 2720	26.1N 127.7E	47997
22	211500	24.1N 129.1E	LAND	PJDR			5777 70408	EYE MOVN 2720	26.1N 127.7E	47997
23	211500	24.1N 129.2E	LAND				5777 73107	EYE MOVN 2720	26.1N 127.7E	47997
24	211700	24.3N 129.4E	LAND				3577 73301	EYE MOVN 2720	26.1N 127.7E	47997
25	211700	24.2N 129.7E	LAND	PJDR			3577 72909	EYE MOVN 2720	26.1N 127.7E	47997
26	211800	24.1N 129.4E	LAND						26.1N 127.7E	47997
27	211800	24.2N 129.5E	LAND	PJDR					26.1N 127.7E	47997
28	211900	24.3N 129.7E	LAND						26.1N 127.7E	47997
29	211910	24.2N 129.5E	LAND	PJDR					26.1N 127.7E	47997
30	211910	24.3N 129.6E	LAND						26.1N 127.7E	47997
31	212000	24.3N 129.6E	LAND				6777 72706	EYE STND	26.1N 127.7E	47997
32	212000	24.4N 129.5E	LAND						26.1N 127.7E	47997
33	212100	24.3N 129.3E	LAND	GROD		40			26.1N 127.7E	47997
34	212100	24.4N 129.3E	LAND				6777 72611	EYE MOVN 2715	26.1N 127.7E	47997
35	212200	24.2N 129.2E	LAND	PJDR			5777 72609	EYE MOVN 2715	26.1N 127.7E	47997
36	212200	24.3N 129.3E	LAND						26.1N 127.7E	47997
37	212300	24.3N 129.0E	LAND	PJDR					26.1N 127.7E	47997
38	220000	24.3N 127.9E	LAND				5777 72808	EYE MOVN 2720	26.1N 127.7E	47997
39	220000	24.3N 127.9E	LAND	PJDR					26.1N 127.7E	47997
40	220100	24.3N 127.7E	LAND	PJDR					26.1N 127.7E	47997
41	220200	27.0N 127.5E	LAND				7777 72714	EYE MOVN 2730	26.1N 127.7E	47997
42	220300	24.2N 127.5E	LAND				7777 72507		26.1N 127.7E	47997
43	220300	24.3N 127.2E	LAND						26.1N 127.7E	47997
44	220400	24.1N 127.2E	LAND	PJDR					26.1N 127.7E	47997
45	220400	24.1N 127.4E	LAND				22704 5777		24.8N 123.3E	47997
46	220500	24.1N 127.1E	LAND				7777 72511		26.1N 127.7E	47997
47	220500	24.2N 127.2E	LAND				22814 53306		24.3N 124.2E	47918
48	220500	24.1N 127.3E	LAND				5777 72405		24.4N 125.3E	47997

49	220500	24.34	127.3E	LAND	GRUU	70	6111 51204	EVE MNUA 0920	26.14	127.7E	67337
50	220600	24.04	127.1E	LAND		70	6111 72200	EVE STNR	24.34	124.2E	67318
51	220600	24.34	127.3E	LAND	GRUU		6111 71804		26.14	127.7E	67337
52	220600	24.24	127.2E	LAND					26.14	127.7E	67337
53	220700	24.34	127.1E	LAND					24.34	124.2E	67318
54	220700	24.14	127.0E	LAND	PRUH		6111 73404	EVE MNUA 2430	26.14	127.7E	67337
55	220800	24.34	127.2E	LAND			220803 6111		26.14	127.7E	67337
56	220800	24.14	127.2E	LAND			6111 71504		24.34	124.2E	67318
57	220800	24.04	127.1E	LAND					26.14	127.7E	67337
58	220800	24.14	127.0E	LAND	PRUH			EVE STNR	24.34	124.2E	67318
59	220835	24.34	127.2E	LAND	PRUH				26.14	127.7E	67337
60	220900	24.14	127.0E	LAND	PRUH			EVE STNR	26.44	127.0E	67337
61	220900	24.34	127.2E	LAND			21073 53001		26.14	127.7E	67337
62	220900	24.34	127.2E	LAND			21073 73005		24.34	124.2E	67318
63	220910	24.34	127.2E	LAND	PRUH		220903 53005		26.14	127.7E	67337
64	221000	24.44	127.2E	LAND					26.44	127.0E	67337
65	221035	24.34	127.0E	LAND	PRUH		21073 52711		26.14	127.7E	67337
66	221100	24.44	127.0E	LAND			7111 73204	EVE MNUA 2420	26.14	127.7E	67337
67	221100	24.44	127.0E	LAND	PRUH				26.44	127.0E	67337
68	221100	24.44	127.3E	LAND					26.14	127.7E	67337
69	221110	24.14	126.4E	LAND	PRUH				26.44	127.0E	67337
70	221135	24.44	127.0E	LAND	PRUH				26.14	127.7E	67337
71	221200	24.44	126.4E	LAND	PRUH		21111 72900	EVE MNUA 3525	26.14	127.7E	67337
72	221200	24.54	126.4E	LAND			21111 53414		26.14	127.7E	67337
73	221200	24.44	126.4E	LAND					24.34	124.2E	67318
74	221210	24.44	127.0E	LAND	PRUH				26.44	127.0E	67337
75	221235	24.54	126.4E	LAND	PRUH		22112 52814	EVE MNUA 3020	26.14	127.7E	67337
76	221300	24.74	126.7E	LAND			21112 73011		26.14	127.7E	67337
77	221300	24.74	126.7E	LAND	GRUU				26.44	127.0E	67337
78	221300	24.44	126.4E	LAND					26.14	127.7E	67337
79	221310	24.74	126.0E	LAND	PRUH				26.44	127.0E	67337
80	221335	24.44	126.4E	LAND	PRUH		6111 73111	EVE MNUA 3020	26.14	127.7E	67337
81	221400	24.44	126.4E	LAND			6111 73111		26.44	127.0E	67337
82	221400	24.74	126.4E	LAND			6111 73111		26.14	127.7E	67337
83	221400	24.74	126.4E	LAND	GRUU		6111 73111		26.44	127.0E	67337
84	221400	24.74	126.4E	LAND					26.14	127.7E	67337
85	221410	24.74	126.7E	LAND	PRUH				26.44	127.0E	67337
86	221435	24.44	126.4E	LAND	PRUH				26.14	127.7E	67337
87	221500	24.74	126.3E	LAND	GRUU		6111 73010	EVE MNUA 2710	26.14	127.7E	67337
88	221500	24.74	126.4E	LAND			21113 52911		26.44	127.0E	67337
89	221500	24.44	126.4E	LAND			6111 00000		26.14	127.7E	67337
90	221500	24.44	126.4E	LAND					26.44	127.0E	67337
91	221510	24.74	126.7E	LAND	PRUH				26.14	127.7E	67337
92	221535	24.74	126.7E	LAND	FAIR				26.44	127.0E	67337
93	221600	24.74	126.7E	LAND	GRUU		21113 53101	EVE MNUA 3220	26.14	127.7E	67337
94	221600	24.44	126.4E	LAND			6111 53310		26.44	127.0E	67337
95	221600	24.74	126.4E	LAND					26.14	127.7E	67337
96	221610	24.34	126.4E	LAND	FAIR				26.44	127.0E	67337
97	221635	25.04	126.4E	LAND	FAIR				26.14	127.7E	67337
98	221700	24.34	126.2E	LAND	GRUU				26.44	127.0E	67337
99	221700	24.74	126.3E	LAND			6111 73004	EVE MNUA 3520	26.14	127.7E	67337
100	221700	24.34	126.3E	LAND			6111 73004		24.34	124.2E	67318
101	221700	25.04	126.3E	LAND			21113 53400		26.14	127.7E	67337
102	221710	25.44	126.7E	LAND	PRUH				26.44	127.0E	67337
103	221735	25.34	126.7E	LAND	FAIR				26.14	127.7E	67337
104	221800	25.04	126.2E	LAND			21114 52404		26.44	127.0E	67337
105	221800	24.34	126.2E	LAND			6111 73203	EVE MNUA 3510	26.14	127.7E	67337
106	221800	25.04	126.1E	LAND	GRUU				26.44	127.0E	67337
107	221800	24.34	126.1E	LAND			6111 73201		26.14	127.7E	67337
108	221800	25.04	126.7E	LAND			6111 73405		24.34	124.2E	67318
109	221800	25.04	126.3E	LAND			6111 73504		26.14	127.7E	67337
110	221800	25.04	126.0E	LAND	GRUU				26.44	127.0E	67337
111	221800	25.14	126.2E	LAND			21113 50108	EVE MNUA 3510	26.14	127.7E	67337
112	221810	25.14	126.2E	LAND	PRUH				26.44	127.0E	67337
113	221835	25.34	126.2E	LAND	PRUH				26.14	127.7E	67337
114	222000	25.34	126.1E	LAND			7111 73410		26.44	127.0E	67337
115	222000	24.34	126.3E	LAND			6111 73512		26.14	127.7E	67337
116	222000	24.34	126.2E	LAND			22013 53512		26.44	127.0E	67337
117	222010	25.44	126.1E	LAND	PRUH				26.14	127.7E	67337
118	222100	24.54	126.4E	LAND			7111 73410		26.44	127.0E	67337
119	222100	24.54	126.2E	LAND			22113 53514		26.14	127.7E	67337
120	222100	25.34	126.2E	LAND			6111 73511		26.44	127.0E	67337
121	222110	25.44	126.1E	LAND	PRUH				26.14	127.7E	67337
122	222135	25.74	126.1E	LAND	PRUH				26.44	127.0E	67337
123	222200	25.74	126.0E	LAND			7111 73410		26.14	127.7E	67337
124	222200	25.54	126.0E	LAND			6111 73308		26.44	127.0E	67337
125	222200	25.74	126.4E	LAND			6111 53219		26.14	127.7E	67337
126	222235	24.04	126.1E	LAND	FAIR				26.44	127.0E	67337
127	222300	24.04	126.7E	LAND			7111 73315		26.14	127.7E	67337
128	222300	24.54	126.4E	LAND			6111 73104		26.44	127.0E	67337
129	222300	24.34	126.4E	LAND			6111 53412		26.14	127.7E	67337
130	222310	24.24	126.1E	LAND	FAIR				26.44	127.0E	67337
131	222335	24.14	126.1E	LAND	FAIR				26.14	127.7E	67337
132	220000	24.14	126.4E	LAND			6111 53030		26.44	127.0E	67337
133	220000	24.04	126.0E	LAND			6111 73325		26.14	127.7E	67337
134	220010	24.14	126.1E	LAND	FAIR				26.44	127.0E	67337
135	220035	24.24	126.1E	LAND	FAIR				26.14	127.7E	67337
136	220100	24.44	126.4E	LAND			10404 53012		26.44	127.0E	67337
137	220100	24.34	126.4E	LAND			6111 73116		26.14	127.7E	67337
138	220110	24.34	126.0E	LAND	PRUH				26.44	127.0E	67337
139	220135	24.44	126.4E	LAND	PRUH				26.14	127.7E	67337
140	220200	24.44	126.2E	LAND			20414 52816		26.44	127.0E	67337
141	220200	24.54	126.4E	LAND			6111 73312		26.14	127.7E	67337
142	220210	24.34	126.4E	LAND	PRUH				26.44	127.0E	67337
143	220235	24.44	126.4E	LAND	PRUH				26.14	127.7E	67337
144	220300	24.54	126.0E	LAND			20224 53113		26.44	127.0E	67337
145	220300	24.44	126.4E	LAND			6111 73115		26.14	127.7E	67337
146	220310	24.44	126.4E	LAND	PRUH				26.44	127.0E	67337
147	220335	24.74	126.2E	LAND	PRUH				26.14	127.7E	67337

NO.	TIME	FIX POSITION	INTENSITY ESTIMATE	NEAREST DATA (NM)	COMMENTS	NO.	TIME	FIX POSITION	INTENSITY ESTIMATE	NEAREST DATA (NM)	COMMENTS
148	210400	24.7N 124.4E	LAND			26.1W	127.7E	47997			
149	210400	24.4N 124.4E	LAND			26.4W	125.3E	47997			
150	210400	24.4N 124.7E	LAND			26.4W	125.3E	47997			
151	210410	24.4N 124.7E	LAND			26.4W	127.8E	47991			
152	210430	24.4N 124.4E	LAND			26.4W	127.8E	47991			
153	210500	27.0N 124.4E	LAND			26.4W	127.8E	47991			
154	210500	27.1N 124.4E	LAND			26.1W	127.7E	47997			
155	210500	24.4N 124.4E	LAND			26.4W	125.3E	47997			
156	210510	24.4N 124.4E	LAND			26.4W	125.8E	47999			
157	210530	24.4N 124.4E	LAND			26.4W	127.8E	47991			
158	210500	24.4N 124.4E	LAND			26.4W	127.8E	47991			
159	210700	24.4N 124.4E	LAND			26.4W	125.8E	47999			
160	210700	24.4N 124.3E	LAND			26.4W	125.3E	47997			
161	210900	27.2N 124.2E	LAND			26.4W	125.3E	47997			
162	210900	24.4N 124.1E	LAND			26.4W	125.3E	47997			
163	210900	27.0N 124.0E	LAND			26.4W	125.3E	47997			
164	210900	27.0N 124.1E	LAND			26.4W	125.8E	47999			
165	211000	27.1N 124.0E	LAND			26.4W	125.8E	47999			
166	211100	27.2N 124.7E	LAND			26.4W	125.8E	47999			
167	211100	27.2N 124.7E	LAND			26.4W	125.8E	47999			
168	211200	27.2N 124.7E	LAND			26.4W	125.8E	47999			
169	211200	27.3N 124.7E	LAND			26.4W	125.8E	47999			
170	211300	27.4N 124.6E	LAND			26.4W	125.8E	47999			
171	211300	27.5N 124.6E	LAND			26.4W	125.8E	47999			
172	211400	27.6N 124.6E	LAND			26.4W	125.8E	47999			
173	211500	27.7N 124.6E	LAND			26.4W	125.8E	47999			
174	211500	27.7N 124.6E	LAND			26.4W	125.8E	47999			
175	211700	27.4N 124.3E	LAND			26.4W	125.8E	47999			
176	211900	24.4N 124.2E	LAND			26.4W	125.8E	47999			
177	211900	24.4N 124.0E	LAND			26.4W	125.8E	47999			

# SYNOPTIC FIXES

FIX NO.	TIME	FIX POSITION	INTENSITY ESTIMATE	NEAREST DATA (NM)	COMMENTS
1	140000	9.0N 154.0E	015	250	
2	141200	11.5N 150.0E	020	250	

# TROPICAL DEPRESSION 14

## CATECHITZ FIXES

FIX NO.	TIME	FIX POSITION	ACCR	OVERLAP CODE	SATFILLITE	COMMENTS	SITE
1	141435	12.7N 148.2E	PCN 6		DMSP	PSN BSU ON WK INL CONV ACTIVITY	KGWC
2	170552	14.7N 148.3E	PCN 6		DMSP		PHIK
3	170921	15.4N 147.3E	PCN 6		DMSP		PHIK
4	171233	14.5N 149.7E	PCN 6		DMSP		PSTW
5	172203	13.4N 146.5E	PCN 3	T1.0/1.0	DMSP	INIT OBS	KGWC
6	172333	13.4N 146.4E	PCN 4	T0.5/0.5 /50.0/24HRS	DMSP		KGWC
7	140813	14.3N 147.0E	PCN 6		DMSP		PSTW
8	141044	14.4N 145.4E	PCN 6		DMSP		PSTW
9	141214	14.2N 145.9E	PCN 6		DMSP		PSTW
10	141214	14.4N 145.4E	PCN 6		DMSP		KGWC
11	141912	14.4N 147.6E	PCN 6		DMSP		KGWC
12	141913	14.4N 145.2E	PCN 3	T1.0/1.0 /50.0/24HRS	DMSP		PSTW
13	142145	15.4N 144.8E	PCN 5		DMSP		PSTW
14	142236	15.4N 144.2E	PCN 6		DMSP		PHIK
15	142314	14.3N 144.2E	PCN 6	T1.0/1.0 /70.5/24HRS	DMSP		KGWC
16	140753	17.7N 147.7E	PCN 6		DMSP		PSTW
17	140753	19.1N 147.4E	PCN 6		DMSP		KGWC
18	141026	14.2N 147.0E	PCN 6		DMSP		PSTW
19	141117	14.4N 147.4E	PCN 6		DMSP		PSTW
20	141155	20.4N 147.4E	PCN 6		DMSP		KGWC
21	141127	22.0N 141.1E	PCN 5	T0.0/0.0 /41.0/24HRS	DMSP		PSTW
22	142358	22.1N 140.7E	PCN 5		DMSP		PSTW
23	240037	22.5N 140.8E	PCN 5		DMSP		PSTW

## AIRCRAFT FIXES

FIX NO.	TIME	FIX POSITION	FLT LVL	70049 OBS MSLP	MAX-WFC-WND VEL/RRG/RWG	MAX-FLT-LVL-WND NTP/VEL/BND/WND	ACCR	EYE SHAPE	EYE ORIENTATION	EYE TEMP (C)	WIND DIR/SPD	WIND NO.
1	140026	13.4N 144.6E	1500FT	1007	25 130 50	140 25 060 120	4 10			25 24	30	1
2	140539	17.0N 143.9E	1500FT	1009	10 120 75	110 15 110 34	4 5			24 24	28	3
3	240100	14.7N 140.5E	7000B	1165		140 15 230 10	4 40					4

# SYNOPTIC FIXES

FIX NO.	TIME	FIX POSITION	INTENSITY ESTIMATE	NEAREST DATA (NM)	COMMENTS
1	140000	12.0N 148.0E	15	300	
2	170000	13.0N 148.0E	15	300	

## TROPICAL STORM KEN

## CATECHETER FIXES

FIX NO.	TIME (Z)	FIX POSITION	ACCR	UNSPAK CODE	SATellite	COMMENTS	SITE
1	012136	24.7N 131.0E	PCN 5		DMSP 17	INIT JDS	PGTW
2	010115	24.4N 131.0E	PCN 5	11.0/1.0	DMSP 14		PGTW
3	010200	24.2N 131.0E	PCN 5		DMSP 14		PGTW
4	010200	24.2N 131.0E	PCN 5	11.0/1.0	DMSP 14	INIT JDS	PGTW
5	011016	24.3N 131.0E	PCN 5		DMSP 17		PGTW
6	011016	24.3N 131.0E	PCN 5		DMSP 17		PGTW
7	011214	24.1N 131.0E	PCN 5		DMSP 14		PGTW
8	011320	24.1N 131.0E	PCN 5		DMSP 14		PGTW
9	011442	24.2N 131.0E	PCN 5		DMSP 14		PGTW
10	012115	24.2N 131.0E	PCN 5	11.0/1.0 / 40.0/20MM	DMSP 17		PGTW
11	020020	24.7N 131.0E	PCN 5		DMSP 14		PGTW
12	020055	24.4N 131.0E	PCN 5		DMSP 14		PGTW
13	020141	24.7N 131.0E	PCN 5		DMSP 14		PGTW
14	020142	24.2N 131.0E	PCN 5	11.0/1.0 / 40.0/20MM	DMSP 14		PGTW
15	020355	27.2N 131.0E	PCN 5		DMSP 17		PGTW
16	021302	27.7N 131.0E	PCN 5		DMSP 14		PGTW
17	021423	24.4N 131.0E	PCN 5		DMSP 14		PGTW
18	022055	24.4N 131.0E	PCN 5	11.5/1.5	DMSP 17	INIT JDS	PGTW
19	022055	24.4N 131.0E	PCN 5		DMSP 17		PGTW
20	030002	24.1N 131.0E	PCN 5	12.5/2.5-11.5/2THRE	DMSP 14		PGTW
21	030123	24.2N 131.0E	PCN 5		DMSP 14		PGTW
22	030123	24.2N 131.0E	PCN 5		DMSP 14		PGTW
23	030217	24.1N 131.0E	PCN 5	13.0/3.0-11.0/20THRE	DMSP 14		PGTW
24	030217	24.2N 131.0E	PCN 5	13.0/3.0	DMSP 14	INIT JDS	PGTW
25	030335	30.7N 130.0E	PCN 5		DMSP 17		PGTW
26	030336	31.1N 130.0E	PCN 5		DMSP 17		PGTW
27	031117	30.7N 130.0E	PCN 5		DMSP 17		PGTW
28	031204	31.4N 131.0E	PCN 5		DMSP 14		PGTW
29	031317	31.7N 131.0E	PCN 5		DMSP 14		PGTW
30	031318	31.7N 131.0E	PCN 5		DMSP 14		PGTW
31	031404	32.0N 131.0E	PCN 5		DMSP 14		PGTW
32	031405	31.7N 131.0E	PCN 5		DMSP 14		PGTW
33	031405	31.4N 131.0E	PCN 5		DMSP 14		PGTW
34	031546	32.1N 131.0E	PCN 5		DMSP 14		PGTW
35	031546	32.4N 131.0E	PCN 5		DMSP 14		PGTW
36	032035	32.3N 131.0E	PCN 5		DMSP 17		PGTW
37	032035	32.3N 131.0E	PCN 5		DMSP 17		PGTW
38	032035	31.1N 131.0E	PCN 5		DMSP 17		PGTW
39	032344	33.4N 131.0E	PCN 5	12.5/2.5-11.0/2THRE	DMSP 14		PGTW
40	032344	33.4N 131.0E	PCN 5	11.0/2.0 / 11.5/2THRE	DMSP 14		PGTW
41	040125	34.3N 130.0E	PCN 5		DMSP 14	FINALED NO7	PGTW

## ATCRAFT FIXES

FIX NO.	TIME (Z)	FIX POSITION	FLT LVL	FOUNT HGT	DOS MSLP	MAX-SFC-WIND VFL/4RG/RNG	MAX-FLT-LVL-WIND WAT/VFL/4RG/RNG	ACCR	EYE SHAPE	EYE ORIENT- DIRM/TATION	EYE TEMP (C) DIR/ 1W DP/RET	MSN NO.
1	012105	24.4N 131.0E	1500FT		30H	60 030	40 170	33 080	4	2	+25 +25	1
2	020720	27.4N 131.0E	700MM	3004	317	50 030	40 220	55 200	6	4	+10 +10	2
3	021332	24.3N 131.0E	700MM	1004	308	15 030	50 130	38 030	12	2	+11 +12	4
4	030725	30.3N 130.0E	700MM	2004	408	50 030	5 210	65 110	4	2	+14 +12	5
5	030713	30.7N 130.0E	700MM	2074	30H	50 180	10 210	65 130	4	2	+13 +12	5

## RADAR FIXES

FIX NO.	TIME (Z)	FIX POSITION	RADAR	ACCR	EYE SHAPE	EYE DIRM	RADAR-CODE ARNAM TDDFF	COMMENTS	RADAR POSITION	QTY WMO NO.
1	012000	24.0N 130.0E	LAND				AS// 50113		28.4N 129.5E	47000
2	020700	24.7N 131.0E	LAND				AS// 50113		28.4N 129.5E	47000
3	020800	24.2N 131.0E	LAND				AS// 53512		28.4N 129.5E	47000
4	020900	27.1N 131.0E	LAND				AS// 53513		28.4N 129.5E	47000
5	021000	27.3N 130.0E	LAND				AS// 53113		28.4N 129.5E	47000
6	021100	27.3N 130.0E	LAND				AS// 52011		28.4N 129.5E	47000
7	021200	27.2N 130.0E	LAND				AS// 52300		28.4N 129.5E	47000
8	021300	24.4N 130.0E	LAND				AS// 51808		28.4N 129.5E	47000
9	021400	27.1N 130.0E	LAND				AS// 53512		28.4N 129.5E	47000
10	021500	27.2N 130.0E	LAND				AS// 53211		28.4N 129.5E	47000
11	021600	27.4N 130.0E	LAND				AS// 53511		28.4N 129.5E	47000
12	021700	27.4N 130.0E	LAND				AS// 50211		28.4N 129.5E	47000
13	021800	27.7N 130.0E	LAND				AS// 50106		28.4N 129.5E	47000
14	021900	27.4N 130.0E	LAND				AS// 53008		28.4N 129.5E	47000
15	022100	24.2N 130.0E	LAND				AS// 50211		28.4N 129.5E	47000
16	022200	24.4N 130.0E	LAND				AS// 50113		28.4N 129.5E	47000
17	022300	24.4N 130.0E	LAND				AS// 53308		28.4N 129.5E	47000
18	030000	24.4N 130.0E	LAND				AS// 53310		28.4N 129.5E	47000
19	030100	24.0N 130.0E	LAND				AS// 53212		28.4N 129.5E	47000
20	030200	27.2N 130.0E	LAND				AS// 53513		28.4N 129.5E	47000
21	030300	27.4N 130.0E	LAND				AS// 50210		28.4N 129.5E	47000
22	030400	24.4N 130.0E	LAND				AS// 51113		28.4N 129.5E	47000
23	030500	24.4N 130.0E	LAND				AS// 50122		28.4N 131.0E	47000
24	030600	24.4N 130.0E	LAND				AS// 50216		28.4N 131.0E	47000
25	031300	31.4N 131.0E	LAND				AS// 50208		33.4N 130.3E	47006



37	051208	26.1N	166.5E	PCN 1		DN4074		PSTW
38	051240	26.1N	166.6E	PCN 1		DN4070		PSTW
39	051320	26.5N	166.4E	PCN 1		DN4075		PSTW
40	051320	26.2N	166.3E	PCN 2		DN4075		RODN
41	051355	27.0N	166.3E	PCN 2		DN4077		PSTW
42	052309	27.3N	166.6E	PCN 1	T5.0/5.0-50.0/21HRC	DN4076		PSTW
43	060020	27.5N	166.6E	PCN 1		DN4076		PSTW
44	060121	27.5N	166.6E	PCN 1		DN4070		PSTW
45	060121	27.5N	166.5E	PCN 1	T6.5/4.5	DN4070	INIT DGS	RPHK
46	060835	27.7N	166.2E	PCN 4		DN4077		PSTW
47	061150	28.1N	166.0E	PCN 1		DN4076		PSTW
48	061221	28.4N	166.2E	PCN 1		DN4070		RODN
49	061221	28.7N	166.2E	PCN 1		DN4070		PSTW
50	061309	28.9N	166.0E	PCN 1		DN4074		PSTW
51	061335	29.5N	166.0E	PCN 2		DN4077		PSTW
52	070009	29.7N	166.2E	PCN 2		DN4074		PSTW
53	070101	30.1N	166.4E	PCN 1	T6.5/4.5-	DN4070		RODN
54	070102	30.0N	166.4E	PCN 3	T3.5/4.5 /W1.5/24HRC	DN4070		PSTW
55	070357	30.7N	166.5E	PCN 1		DN4077		PSTW
56	071137	30.4N	166.4E	PCN 1		DN4076		PSTW
57	071202	31.7N	166.2E	PCN 5		DN4070		RODN
58	071202	31.7N	167.0E	PCN 5		DN4070		PSTW
59	071432	32.0N	167.1E	PCN 3		DN4074		PSTW
60	072056	33.7N	166.2E	PCN 3	T2.0/3.0 /W1.5/20HRC	DN4077		PSTW
61	072233	34.0N	166.0E	PCN 3		DN4076		PSTW
62	080043	34.2N	166.9E	PCN 3	T2.5/3.5 /W2.0/24HRC	DN4070		RODN
63	080043	34.3N	166.9E			DN4074		PSTW

# ATCRAFT FIXES

FLX NO.	TIME (Z)	FIX POSITION	FLT LVL	Y0043 HGT	D85 MSLE	MAX-SFC-WND VEL/3RG/4RG	MAX-FLT-LVL-WND 014/VEL/800/4NG	ACCRV NAV/WFT	EYE SHAPE	EYE ORIEN- DIRM/TATION	EYE TEMP (C) OUT/ IN/ DP/5GT	WSN NO.
1	071932	23.5N	169.7E	700NM	3044		040	45 270 15	4		+14 +13	4
2	072046	23.5N	169.7E	700NM	3001	900	45 090 20	170 49 080 40	4	2	+11 +15 +13	4
3	040809	24.0N	169.1E	700NM	2917	978	65 120 15	340 71 320 30	2	4	+04 +16 +12	5
4	041913	24.4N	167.0E	700NM	2911		35 270 30	240 50 260 5	4	4	+17 + 6	6
5	042118	25.1N	166.9E	700NM	2751	965	75 350 15	020 68 330 4	10		+11 +15 + 8	6
6	050506	25.7N	166.6E	700NM	2743		40 300 10	310 87 230 10	3	4	+19 +10	7
7	050848	25.9N	166.5E	700NM	2757	959	60 210 50	250 86 180 10	2	4	+12 +19 +12	7
8	051943	27.0N	166.4E	700NM	2665		45 250 40	340 82 300 20	4	4	+23	8
9	052120	27.1N	166.5E	700NM	2656		45 070 40	070 45 360 30	4	4	+14 +17	8
10	060610	27.3N	166.5E	700NM	2683	953	70 280 20	040 71 290 50	2	4	+19 +13	9
11	060850	28.1N	166.4E	700NM	2744	960	50 080 40	140 72 090 94	2	4	+17 +17 +15	9
12	061943	28.7N	166.3E	700NM	2864		75 080 5	040 60 330 30	4	0	+14 +12	10
13	062137	29.7N	166.2E	700NM	2890	984	75 080 5	210 60 170 30	4	10	+11 +15 +14	10
14	070539	30.7N	166.4E	700NM	2907		50 260 40	020 57 310 30	3	0	+15 +12	11
15	070829	31.2N	166.4E	700NM	2924	974	70 040 10	200 77 170 64	2	3	+ 4 +15 +12	11
16	071846	31.2N	167.4E	700NM	2942		65 120 40	240 47 120 30	4	2	+19 +12	12
17	072102	33.5N	169.1E	700NM	3004		40 060 160	170 49 060 125	4	4	+14 +17 +12	12

TYPHOON MAC

SATELLITE FIXES

FIX NO.	TIME (Z)	FIX POSITION	ACCUR	UNIQUE CODE	SATELLITE	COMMENTS	SITE
1	140008	11.9N 134.5E	PCN 5	T0.0/0.0	DMEP1A	INIT JDS	PGTW
2	140030	11.9N 134.5E	PCN 5		DMEP1A		PGTW
3	140217	11.5N 134.9E	PCN 5		DMEP1A		PGTW
4	141250	11.9N 134.7E	PCN 5		DMEP1A		PGTW
5	141404	12.0N 134.2E	PCN 5		DMEP1A		PGTW
6	142157	12.2N 133.6E	PCN 5	T0.0/0.0	DMEP1A	INIT JDS	RPNK
7	142350	12.2N 133.0E	PCN 5	T1.0/1.0 /01.0/24HRC	DMEP1A		PGTW
8	141037	12.4N 131.6E	PCN 6		DMEP1A		RPNK
9	141232	12.9N 130.8E	PCN 5		DMEP1A		PGTW
10	141252	12.5N 130.0E	PCN 5		DMEP1A		PGTW
11	141346	12.2N 131.9E	PCN 6		DMEP1A		RPNK
12	141327	12.2N 131.0E	PCN 5		DMEP1A		RPNK
13	142136	12.9N 129.1E	PCN 5	T0.5/0.5 /00.5/24HRC	DMEP1A		PGTW
14	142137	13.0N 129.6E	PCN 5		DMEP1A		PGTW
15	142332	13.3N 129.0E	PCN 5	T1.0/1.0 /00.0/24HRC	DMEP1A		PGTW
16	140133	13.5N 128.8E	PCN 5		DMEP1A		PGTW
17	140227	13.4N 128.7E	PCN 5		DMEP1A		PGTW
18	141017	13.4N 127.3E	PCN 5		DMEP1A		PGTW
19	141017	13.3N 127.0E	PCN 6		DMEP1A		RPNK
20	141214	13.2N 126.3E	PCN 5		DMEP1A		PGTW
21	142117	14.1N 125.2E	PCN 6		DMEP1A		PGTW
22	170114	13.6N 125.4E	PCN 5	T2.5/2.5 /01.5/24HRC	DMEP1A		PGTW
23	170114	13.6N 125.4E	PCN 5	T2.0/2.0 /01.5/24HRC	DMEP1A		RPNK
24	170357	13.9N 125.3E	PCN 5		DMEP1A		PGTW
25	171355	13.9N 125.0E	PCN 5		DMEP1A		RPNK
26	171356	13.4N 125.2E	PCN 5		DMEP1A		RPNK
27	172238	13.9N 124.4E	PCN 6		DMEP1A		RPNK
28	180038	13.4N 123.8E	PCN 5	T3.5/3.5 /01.0/24HRC	DMEP1A		PGTW
29	180237	13.7N 123.4E	PCN 3	T3.5/3.5 /01.5/24HRC	DMEP1A		RPNK
30	180237	13.4N 123.4E	PCN 3	T3.5/3.5	DMEP1A	INIT JDS	RPNK
31	181118	13.3N 122.3E	PCN 4		DMEP1A		RPNK
32	181118	13.3N 122.7E	PCN 6		DMEP1A		RPNK
33	181320	13.2N 122.2E	PCN 5		DMEP1A		PGTW
34	181336	13.2N 122.3E	PCN 5		DMEP1A		RPNK
35	181327	13.3N 122.2E	PCN 5		DMEP1A		PGTW
36	182218	13.7N 121.5E	PCN 6		DMEP1A		RPNK
37	182218	13.5N 121.4E	PCN 6		DMEP1A		PGTW
38	180020	13.4N 121.1E	PCN 5	T2.5/3.5 /01.0/24HRC	DMEP1A		PGTW
39	180218	13.9N 120.7E	PCN 5	T2.5/3.0 /01.0/24HRC	DMEP1A		RPNK
40	180218	13.2N 120.8E	PCN 5	T2.5/3.5 /01.0/24HRC	DMEP1A		RPNK
41	181058	13.7N 120.6E	PCN 6		DMEP1A	PSBL 2ND CNTN AT 153N 120E	RPNK
42	181058	13.7N 119.7E	PCN 5		DMEP1A		RPNK
43	181302	13.5N 118.8E	PCN 5		DMEP1A		PGTW
44	181313	13.2N 118.6E	PCN 5		DMEP1A		RPNK
45	181317	13.7N 119.3E	PCN 5		DMEP1A		RPNK
46	181318	13.5N 118.8E	PCN 5		DMEP1A		PGTW
47	182157	14.5N 118.4E	PCN 5		DMEP1A		PGTW
48	182157	14.7N 117.8E	PCN 5		DMEP1A		RPNK
49	182157	13.9N 118.2E	PCN 6		DMEP1A		RPNK
50	200144	14.5N 118.8E	PCN 5	T1.0/2.0 /01.5/24HRC	DMEP1A		RPNK
51	200159	14.8N 118.9E	PCN 3	T2.0/2.0 /00.5/24HRC	DMEP1A		RPNK
52	200159	14.8N 118.8E	PCN 3	T1.5/2.5 /01.0/24HRC	DMEP1A		PGTW
53	201038	17.5N 118.5E	PCN 5		DMEP1A		PGTW
54	201244	17.5N 117.7E	PCN 5		DMEP1A		PGTW
55	201439	17.7N 117.5E	PCN 6		DMEP1A		RPNK
56	201440	17.8N 118.3E	PCN 5		DMEP1A		RPNK
57	202137	18.4N 117.3E	PCN 5		DMEP1A		PGTW
58	202319	18.4N 117.7E	PCN 5		DMEP1A		RPNK
59	210114	18.9N 117.3E	PCN 5	T1.0/1.0 /50.0/24HRC	DMEP1A		RPNK
60	210126	18.7N 117.7E	PCN 5	T1.0/2.0 /01.0/24HRC	DMEP1A		RPNK
61	210140	18.9N 117.2E	PCN 5	T1.0/1.5 /50.0/24HRC	DMEP1A		PGTW
62	210321	19.0N 116.8E	PCN 5		DMEP1A		RPNK
63	211018	19.4N 117.4E	PCN 5		DMEP1A		PGTW
64	211421	19.4N 117.1E	PCN 5		DMEP1A		RPNK
65	211421	19.4N 116.9E	PCN 5		DMEP1A		RPNK
66	212258	19.4N 116.6E	PCN 5	T2.0/2.0 /01.0/24HRC	DMEP1A		RPNK
67	212258	20.4N 116.4E	PCN 5		DMEP1A		RPNK
68	220108	20.4N 116.6E	PCN 5		DMEP1A		RPNK
69	220302	20.4N 116.4E	PCN 5	T3.0/3.0 /02.0/24HRC	DMEP1A		RPNK
70	220302	20.4N 116.1E	PCN 5		DMEP1A		RPNK
71	221139	20.3N 116.8E	PCN 5		DMEP1A	PSN BSU ON EXTRAP OF CLD LINE	RPNK
72	221402	20.4N 116.9E	PCN 5		DMEP1A		RPNK
73	221402	21.3N 116.2E	PCN 5		DMEP1A		RPNK
74	222238	21.4N 116.7E	PCN 5	T2.0/2.0 /50.0/24HRC	DMEP1A		RPNK
75	230050	21.4N 116.5E	PCN 5	T2.5/3.0 /00.5/24HRC	DMEP1A		RPNK
76	230050	21.5N 116.5E	PCN 5	T2.5/2.5	DMEP1A	INIT JDS	PGTW
77	230243	21.5N 116.1E	PCN 3		DMEP1A		RPNK
78	230243	21.0N 117.9E	PCN 5		DMEP1A		RPNK
79	231118	22.2N 117.4E	PCN 6		DMEP1A		RPNK
80	231119	22.1N 117.9E	PCN 6		DMEP1A		RPNK
81	231342	22.1N 117.6E	PCN 5		DMEP1A		RPNK
82	231343	22.4N 117.3E	PCN 6		DMEP1A		RPNK
83	231343	22.1N 117.8E	PCN 5		DMEP1A		RPNK
84	232218	22.5N 117.8E	PCN 5		DMEP1A		RPNK
85	240031	22.4N 117.9E	PCN 5		DMEP1A		RPNK
86	240224	22.4N 117.8E	PCN 3	T1.5/2.5 /01.0/24HRC	DMEP1A		RPNK

# ATSCRAFT FIXES

FIA NO.	TIME (Z)	FIX POSITION	FLY LVL	Y0042 HRT	DOS MSLE	MAX-SFC-MVD VEL/ARG/MVG	MAX-FLT-LVL-4ND ITH/VEL/GND/4ND	ACFTY NAV/MFT	EYE SHAPE	EYE ORIEN- 3144/TATION	BYE TEMP (C) DUT/ 1W DP/ACT	ASN NO.
1	170503	13.7M 124.0E	700MM	7054	995	40 050 10	17N 68 050 10	3 4			+10 +15 +11	2
2	170507	13.5M 124.0E	700MM	7043	994	30 110 30	16N 58 050 40	4 4			+13 +11	4
3	170518	13.3M 124.0E	700MM	7056	994	50 160 30	16N 52 340 30	4 20			+10 +10 + 8	4
4	170511	13.4M 122.0E	700MM	7061		40 160 75	16N 65 300 50	2 4			+11 +15 + 9	6
5	171436	13.4M 121.0E	700MM	7032			16N 65 230 24	1 4			+11 +11	7
6	172042	13.5M 121.7E	700MM	7046		20 310 30	16N 28 050 24	1 2			+10 +11 +11	9
7	170929	13.7M 120.3E	700MM	7101		40 150 25		4 2			+11 + 4	10
8	200909	17.4M 119.1E	700MM	7104	1005	40 070 15	13N 31 050 14	2 4			+11 +13 + 8	12
9	201933	17.3M 119.1E	700MM	7061	1000	40 070 15	11N 60 300 120	6 5			+12 +10	14
10	202151	14.1M 119.1E	700MM	7067	997	20 090 30	16N 24 040 60	4 4			+10 +15 + 9	14
11	210619	14.1M 119.0E	700MM	7093	998	40 350 10	05N 20 300 44	10 10				15
12	210906	14.2M 117.5E	1500FT		999	40 070 60	11N 37 070 40	20 1			+25 +26 28	15
13	212100	21.0M 119.1E	1500FT									16

# BAJAH FIXES

FIA NO.	TIME (Z)	FIX POSITION	MADAR	ACFTY	EYE SHAPE	EYE DIAM	BAJAH-CODE 4544M TDDFF	COMMENTS	MADAR POSITION	CLTF 440 NO.
1	171859	13.7M 124.3E	ACFT							44004
2	172300	13.8M 123.9E	LAND				10710 ////		14.1M 123.0E	00440
3	172300	14.5M 123.5E	LAND				6777 ////		16.3M 120.6E	00371
4	180900	13.3M 122.0E	LAND				20777 52116		14.1M 123.0E	00440
5	181030	13.7M 122.0E	LAND				25777 ////		22.3M 114.2E	45004
6	181100	13.5M 122.0E	LAND				10677 ////		16.3M 120.6E	00371
7	181100	13.7M 122.0E	LAND				25777 ////		16.3M 120.6E	00371
8	181200	13.5M 122.7E	LAND				11677 ////		16.3M 120.6E	00371
9	181300	13.5M 122.7E	LAND				10677 ////		16.3M 120.6E	00371
10	181500	13.5M 122.0E	LAND				10677 ////		16.3M 120.6E	00371
11	181530	13.5M 122.3E	LAND				70777 72777		14.1M 123.0E	00440
12	181600	13.5M 122.5E	LAND				11777 52705		16.3M 120.6E	00371
13	182145	13.4M 121.0E	LAND	FAIR	CIRCULAR	15			15.2M 120.6E	00377
14	182230	13.4M 121.5E	LAND	FAIR	CIRCULAR	15			15.2M 120.6E	00377
15	182255	13.4M 121.4E	LAND	FAIR	CIRCULAR	15			15.2M 120.6E	00377
16	181205	15.1M 120.5E	LAND	PHUR	CIRCULAR	4			15.2M 120.6E	00377
17	181300	15.2M 120.2E	LAND	PHUR	CIRCULAR	5			15.2M 120.6E	00377
18	181300	15.2M 120.2E	LAND				67777 ////		16.3M 120.6E	00371
19	181335	15.1M 120.0E	LAND	PHUR		5			15.2M 120.6E	00377
20	181400	15.0M 120.0E	LAND				67777 ////		16.3M 120.6E	00371
21	182200	16.0M 119.0E	LAND				10677 10677		16.3M 120.6E	00371
22	200000	16.3M 119.0E	LAND				10677 10677		16.3M 120.6E	00371
23	200040	16.4M 119.5E	LAND				12667 52912		16.3M 120.6E	00371
24	200100	16.4M 119.0E	LAND				10517 53218		16.3M 120.6E	00371
25	200100	17.5M 119.5E	LAND				10677 57777		16.3M 120.6E	00371
26	200130	16.7M 119.7E	LAND				10677 42916		16.3M 120.6E	00371
27	200300	16.2M 119.4E	LAND				10677 63077		16.3M 120.6E	00371
28	200500	17.0M 119.6E	LAND				10607 67777		16.3M 120.6E	00371
29	200700	17.2M 119.4E	LAND				10677 57777		16.3M 120.6E	00371
30	200900	17.3M 119.7E	LAND				10677 57777		16.3M 120.6E	00371
31	200900	17.3M 119.7E	LAND				10677 57777		16.3M 120.6E	00371
32	201200	17.4M 119.0E	LAND				45617 67777		16.3M 120.6E	00371
33	202000	20.4M 119.0E	LAND				67777 11777		22.3M 114.2E	45004
34	202200	20.5M 119.4E	LAND				67777 11777		22.3M 114.2E	45004
35	202500	20.5M 119.0E	LAND				67777 11777		22.3M 114.2E	45004
36	203000	20.3M 119.9E	LAND				67777 11777		22.3M 114.2E	45004
37	201200	20.3M 119.5E	LAND				67777 11777		22.3M 114.2E	45004
38	201300	20.3M 119.5E	LAND				40013 57700		22.3M 114.2E	45004
39	201400	20.3M 119.5E	LAND				40013 54400		22.3M 114.2E	45004
40	202100	21.2M 119.7E	LAND				40023 53100		22.3M 114.2E	45004
41	202300	21.4M 119.6E	LAND				40523 53067		22.3M 114.2E	45004
42	200000	21.4M 119.5E	LAND				40523 53061		22.3M 114.2E	45004
43	200200	21.4M 119.3E	LAND				40542 52906		22.3M 114.2E	45004
44	200300	21.5M 119.1E	LAND				57777 52906		22.3M 114.2E	45004
45	200500	21.7M 119.0E	LAND				57777 52906		22.3M 114.2E	45004
46	200900	21.7M 119.7E	LAND				57777 52903		22.3M 114.2E	45004
47	201200	21.3M 119.9E	LAND				67777 11777		22.3M 114.2E	45004
48	201500	22.2M 119.0E	LAND				11777 11777		22.3M 114.2E	45004
49	201900	22.1M 119.3E	LAND				67777 11777		22.3M 114.2E	45004
50	202000	22.1M 119.0E	LAND				40012 11777		22.3M 114.2E	45004
51	202100	22.1M 119.0E	LAND				67777 11777		22.3M 114.2E	45004
52	202200	22.1M 119.0E	LAND				67777 11777		22.3M 114.2E	45004
53	200000	22.1M 119.7E	LAND				67777 11777		22.3M 114.2E	45004
54	200100	22.1M 119.6E	LAND				67777 11777		22.3M 114.2E	45004
55	200300	22.1M 119.6E	LAND				67777 11777		22.3M 114.2E	45004

## TROPICAL STORM NANCY

## KATELITE FIXES

FIX NO.	TIME (Z)	FIX POSITION	ACRY	UNRAK CODE	SATellite	COMMENTS	SITE
1	142218	14.34 111.9E	PCN 6		DMS037		PBTW
2	142218	14.14 111.5E	PCN 6		DMS037		RPNK
3	140218	14.44 111.2E	PCN 5	T1.0/1.0	DMS034	INIT JDS	RPNK
4	140218	14.04 112.0E	PCN 5	T3.0/3.0	DMS039	INIT JDS	ROON
5	141058	14.44 110.8E	PCN 4		DMS037		RPNK
6	141058	14.24 110.7E	PCN 3		DMS037		ROON
7	141459	14.14 110.4E	PCN 3		DMS039	EYE HANDING POSSIBLE	RPNK
8	141459	14.54 110.5E	PCN 4		DMS039		KGWC
9	142338	14.64 109.5E	PCN 4		DMS037		KGWC
10	142339	14.04 110.0E	PCN 4	T3.0/3.0 /02.0/21HRS	DMS039		RPNK
11	240144	14.04 109.4E		T3.0/3.0 /50.0/24HRS	DMS034		ROON
12	240340	14.64 109.8E	PCN 3		DMS034		RPNK
13	241219	14.74 109.2E	PCN 4		DMS037		RPNK
14	241219	14.34 108.6E	PCN 4		DMS037		KGWC
15	241439	14.64 108.7E	PCN 4		DMS039		RPNK
16	241440	14.64 108.4E	PCN 3		DMS039		ROON
17	242319	17.54 108.3E	PCN 5		DMS037		ROON
18	242319	14.24 108.6E	PCN 5	T2.5/3.0 /40.5/24HRS	DMS037		RPNK
19	210108	17.64 107.9E	PCN 5		DMS034		RPNK
20	210126	14.24 108.2E	PCN 5		DMS034		RPNK
21	210321	17.74 107.9E	PCN 3	T4.0/4.0-0/01.0/24HRS	DMS034		ROON
22	210321	14.14 108.1E	PCN 5		DMS039		RPNK
23	211159	14.14 108.1E	PCN 4		DMS037		RPNK
24	211421	17.34 107.4E	PCN 3		DMS034		ROON
25	211421	17.34 107.9E	PCN 3		DMS039		RPNK
26	212258	17.34 107.3E	PCN 5		DMS037		ROON
27	212258	17.64 107.4E	PCN 5	T1.5/2.5 /41.0/24HRS	DMS037		RPNK
28	220302	17.34 107.2E	PCN 3	T4.0/4.0-0/50.0/24HRS	DMS034		ROON
29	220302	17.54 106.4E	PCN 3		DMS034		RPNK
30	221139	14.44 106.6E	PCN 3		DMS037		ROON
31	221139	14.44 106.6E	PCN 6		DMS037		RPNK
32	221402	14.44 106.5E	PCN 5		DMS034		ROON
33	221402	14.44 106.1E	PCN 5		DMS034		RPNK

## SYNOPTIC FIXES

FIX NO.	TIME (Z)	FIX POSITION	INTENSITY ESTIMATE	NEAREST DATA (NM)	COMMENTS
1	171200	14.04 112.0E	15	120	
2	140000	17.54 111.5E	15	90	
3	141200	14.04 111.5E	15	60	
4	140000	14.04 111.2E	20	120	
5	141200	14.34 110.7E	25	120	
6	200000	14.54 109.5E	25	50	
7	241200	14.14 108.4E	10	20	
8	210000	17.24 108.4E	20	70	
9	211200	17.04 108.0E	5	20	
10	220000	17.04 107.0E	5	70	
11	220500	14.54 106.0E	25	120	
12	221200	17.04 107.0E	5	120	
13	240000	14.34 106.0E	16	120	
14	240000	14.34 106.0E	17	120	
15	240000	15.74 102.5E	10	80	

TYPHOON OWEN

SATELLITE FIXES

FLA NO.	TIME (Z)	FIX POSITION	ACQRY	DVTRAK CODE	SATELLITE	COMMENTS	SITE
1	210140	17.7N 130.4E	PCN 5	T1.0/1.0	DMSP34	INIT JDS	PGTW
2	211225	17.4N 130.4E	PCN 5		DMSP34		PGTW
3	212117	16.4N 130.4E	PCN 5		DMSP37		PGTW
4	212326	16.3N 130.6E	PCN 5	T2.0/2.0 /01.0/23HRS	DMSP34		PGTW
5	220120	16.0N 130.7E	PCN 5		DMSP34		PGTW
6	220357	16.5N 137.2E	PCN 5		DMSP37		PGTW
7	221209	16.4N 130.4E	PCN 5		DMSP34		PGTW
8	221220	16.4N 130.5E	PCN 5		DMSP34		PGTW
9	221220	16.5N 130.7E	PCN 5		DMSP34		RODN
10	222057	16.0N 130.4E	PCN 5		DMSP37		PGTW
11	222308	16.0N 130.7E	PCN 5		DMSP34		PGTW
12	230102	16.0N 130.4E	PCN 5	T0.0/0.0	DMSP34	INIT JDS	RPMK
13	230102	16.4N 130.5E	PCN 5	T2.0/2.0 /50.0/24HRS	DMSP34		PGTW
14	230437	16.4N 130.6E	PCN 5		DMSP37		PGTW
15	231201	16.7N 130.2E	PCN 5		DMSP34		PGTW
16	232036	16.4N 130.5E	PCN 5		DMSP37		PGTW
17	240031	16.4N 130.7E	PCN 5	T2.0/2.0 /02.0/23HRS	DMSP34		RPMK
18	240032	16.7N 130.4E	PCN 5		DMSP34		PGTW
19	240042	16.3N 130.0E	PCN 3	T3.0/3.0 /01.0/24HRS	DMSP34		PGTW
20	240043	16.4N 130.7E	PCN 3	T3.0/3.0	DMSP34	INIT JDS	RODN
21	240417	16.2N 137.7E	PCN 5		DMSP37		PGTW
22	240917	16.7N 131.3E	PCN 5		DMSP37		RODN
23	241311	16.4N 131.0E	PCN 3		DMSP34		RPMK
24	241314	16.3N 130.7E	PCN 5		DMSP34		PGTW
25	241324	16.2N 130.7E	PCN 5		DMSP34		RODN
26	241324	16.1N 130.1E	PCN 5		DMSP34		RPMK
27	242127	20.3N 131.2E	PCN 3	T4.0/4.0 /02.0/22HRS	DMSP37		PGTW
28	242158	20.7N 130.4E	PCN 3		DMSP37		RODN
29	242158	20.4N 130.4E	PCN 3		DMSP37		RODN
30	240014	21.0N 130.8E	PCN 3	T4.5/4.5 /01.5/24HRS	DMSP34		PGTW
31	240205	21.3N 130.6E	PCN 3		DMSP34		RODN
32	240205	21.2N 130.5E	PCN 1	T4.5/4.5 /01.5/25HRS	DMSP34		PGTW
33	241038	21.2N 129.7E	PCN 1		DMSP37		RODN
34	241039	21.2N 129.7E	PCN 1		DMSP37		PGTW
35	241256	22.0N 129.8E	PCN 1		DMSP34		RODN
36	241304	24.4N 129.4E	PCN 2		DMSP34		RPMK
37	241305	22.0N 129.7E	PCN 1		DMSP34		RODN
38	242137	23.1N 129.2E	PCN 1		DMSP37		PGTW
39	242147	22.3N 129.2E	PCN 1	T5.5/5.5 /01.5/24HRS	DMSP37		RPMK
40	240145	23.3N 129.4E	PCN 1		DMSP34		RPMK
41	240146	23.3N 129.1E	PCN 1	T6.0/6.0 /01.5/24HRS	DMSP34		RODN
42	240146	23.3N 129.0E	PCN 1	T6.0/6.0 /01.5/25HRS	DMSP34		PGTW
43	241318	23.3N 129.2E	PCN 1		DMSP37		PGTW
44	241318	23.4N 129.2E	PCN 1		DMSP37		RODN
45	241328	24.0N 129.3E	PCN 1		DMSP34		PGTW
46	241334	23.7N 129.3E	PCN 1		DMSP37		RODN
47	241246	23.8N 129.1E	PCN 1		DMSP34		RPMK
48	241246	23.4N 129.3E	PCN 3		DMSP34	EYE NOT VSHL	PGTW
49	241246	24.0N 129.2E	PCN 3		DMSP34		RKSO
50	242117	24.5N 129.5E	PCN 1		DMSP37		PGTW
51	242117	24.3N 129.5E	PCN 1		DMSP37		RODN
52	242339	24.7N 129.5E	PCN 1	T5.0/5.0 /01.0/22HRS	DMSP34		PGTW
53	242338	24.4N 129.4E	PCN 1	T5.0/5.0 /01.0/22HRS	DMSP34		RODN
54	270127	24.8N 129.5E	PCN 1	T6.0/6.0 /00.5/24HRS	DMSP34		RPMK
55	270127	24.0N 129.5E	PCN 1		DMSP34		PGTW
56	270127	24.2N 129.3E	PCN 1		DMSP34		RODN
57	270358	24.7N 129.6E	PCN 1		DMSP37		RODN
58	270358	24.3N 129.8E	PCN 1		DMSP37		PGTW
59	271220	24.1N 129.8E	PCN 1		DMSP34		PGTW
60	271226	24.0N 129.4E	PCN 1		DMSP34		RPMK
61	271227	24.1N 129.6E	PCN 1		DMSP34		PGTW
62	271227	24.4N 129.5E	PCN 1		DMSP34		RODN
63	272057	24.7N 129.4E	PCN 1		DMSP37		PGTW
64	272057	24.5N 130.0E	PCN 1		DMSP37		RODN
65	272320	27.0N 129.8E	PCN 1	T4.0/5.0 /01.0/24HRS	DMSP34		PGTW
66	240108	27.2N 129.8E	PCN 1		DMSP34		PGTW
67	240108	27.1N 129.5E	PCN 1	T4.5/5.0 /00.5/24HRS	DMSP34		RODN
68	240437	27.7N 129.7E	PCN 1		DMSP37		PGTW
69	241114	27.3N 129.8E	PCN 1		DMSP37		RODN
70	241202	27.5N 129.8E	PCN 1		DMSP34		PGTW
71	241207	27.5N 129.6E	PCN 1		DMSP34		RKSO
72	241207	27.5N 129.4E	PCN 1		DMSP34		PGTW
73	242037	27.4N 129.6E	PCN 2		DMSP37		PGTW
74	240025	30.7N 131.8E	PCN 3	T4.0/4.5 /00.5/22HRS	DMSP34		RKSO
75	240043	31.0N 129.4E	PCN 1	T4.5/4.5 /00.0/24HRS	DMSP34		RODN
76	241230	24.2N 129.7E	PCN 1	T4.5/4.5	DMSP34	INIT JDS	RKSO
77	241054	24.4N 130.2E	PCN 1		DMSP37		RPMK
78	241157	24.2N 130.4E	PCN 1		DMSP34		PGTW
79	241325	24.3N 130.0E	PCN 1		DMSP34		RODN
80	241330	24.2N 130.4E	PCN 1		DMSP34		RKSO
81	242155	30.6N 131.3E	PCN 3	T4.0/4.0	DMSP37	INIT JDS	PGTW
82	242154	30.3N 131.3E	PCN 3		DMSP34		RODN
83	300211	31.5N 130.0E	PCN 3	T4.5/4.5	DMSP34	INIT JDS	RPMK
84	300211	31.6N 130.2E	PCN 3		DMSP34		PGTW
85	301124	30.0N 130.4E	PCN 6		DMSP34		PGTW
86	301311	30.2N 130.2E	PCN 5		DMSP34		RPMK
87	301311	30.5N 130.8E	PCN 5		DMSP34		RODN

## 41304AF1 FIXES

FL NO.	TIME (Z)	FLA POS (T, P)	FLI (VL)	FOOT (T)	MSLP	MAX-SFC-WIND VEL (IRG/4WG)	MAX-FLT-LVL-WIND (11M/VEL/3MG/4MG)	APPROX MAX/WFT	EYE SHAPE	PRE ORIENT-314W/TATION	OFF TEMP (T) WIND DIR/SP/CLT	WIND NO.	
1	220115	12.2N 114.4E	1500F1		999	15 250	65 14N	16 100	65	5 10		1	
2	220133	12.2N 117.4E	1500F1		1002	15 290	30 14N	20 330	30	5 10	+20 +25 +22 29	2	
3	220140	11.2N 117.2E	7000M	1077			04N	28 310	35	5 5		3	
4	220213	12.2N 117.0E	1500F1		1002	15 060	30 17N	18 060	25	5 10	+20 +26 +23 30	4	
5	210530	17.3N 124.7E	1500F1		999	70 150	25 14N	60 180	15	5 15	+25 +23 4	5	
6	210401	11.1N 134.4E	7000M	1041	1002	15 0		33 210	75	5 25	+ 9 + 8 4	6	
7	211223	14.2N 136.4E	7000M	1015			14N	45 120	15N	5 10	+11 +10 5	7	
8	222216	14.2N 136.4E	7000M	1047	990	60 090	8 17N	66 110	9N	5 2	+14 +13 +10 5	8	
9	240604	17.4N 114.2E	7000M	1022		55 100	65 14N	50 080	10N	1 3	+13 +10 6	9	
10	240558	14.2N 137.4E	7000M	1061		65 090	30 14N	65 050	5N	3 2	+11 +15 +10 6	10	
11	241910	20.2N 131.4E	7000M	1082			14N	70 100	3N	5 1	+19 + 6 7	11	
12	242155	20.2N 131.2E	7000M	1083	967	40 040	5 17N	63 040	9N	5 1	+14 +17 + 6 7	12	
13	240733	21.2N 120.4E	7000M	1011		40 160	8 12N	75 080	12	5 5	+14 +17 + 6 8	13	
14	240904	21.2N 120.4E	7000M	1055	944	40 110	8 12N	79 040	5	5 5		14	
15	242131	22.2N 120.4E	7000M	1375	918	30 050	3 110	12	8 2	1	+19 +15 +14 8	15	
16	240033	21.2N 120.0E	7000M	1040		100 250	3 31N	95 250	8 2	1	+13 +20 +13 9	16	
17	240222	21.2N 120.0E	7000M	1014	922	30 130	3 02N	90 330	10	2 1		17	
18	240330	21.4N 120.2E	7000M	1382	919	40 250	15 30N	95 250	5 2	1	+16 +17 + 7 10	18	
19	242140	21.2N 120.4E	7000M	1394	942	40 170	18 30N	84 240	15	5 10	+16 +16 +16 11	19	
20	270240	24.2N 120.4E	7000M	1032		40 270	72 45N	60 270	3N	5 10	+14 +17 12	20	
21	271548	25.2N 120.7E	7000M	1050		70 190	35 70N	70 190	3N	2 1	+14 +17 12	21	
22	280112	27.1N 120.4E	7000M	1084	953	50 230	30 31N	61 240	9N	5 5	ELLIPTICAL 20 10 030	+14 +15 +15 13	22
23	280315	27.1N 120.7E	7000M	1087		50 090	120 34N	65 270	3N	5 5	ELLIPTICAL 35 15 220	+16 +16 +16 13	23
24	280614	27.2N 120.7E	7000M	1054		50 040	50 13N	78 040	5N	5 5		+16 +16 13	24
25	280835	27.4N 120.4E	7000M	1071	954	70 090	30 14N	81 090	6N	5 3	ELLIPTICAL 25 15 120	+16 +17 +13 14	25
26	282147	27.3N 120.4E	7000M	1082	952	65 040	30 12N	75 020	6N	2 1	CIRCULAR 2	+16 +17 15	26
27	270048	24.2N 120.7E	7000M	1084		70 250	30 14N	70 260	6N	2 1		+16 +15 15	27
28	270042	24.2N 120.7E	7000M	1085		45 050	120 75N	75 090	15	2 1	CIRCULAR 12	+16 +15 15	28
29	280624	24.2N 120.7E	7000M	1088		40 090	120 14N	64 110	7N	10 5	CIRCULAR 12	+16 +17 +15 16	29
30	280948	24.4N 130.1E	7000M	1088A	952	65 270	30 14N	64 270	2N	5 5	ELLIPTICAL 15 10 310	+16 +18 +15 16	30
31	282142	30.4N 131.1E	7000M	1702	956	50 040	30 15N	74 040	6N	5 5	CIRCULAR 9	+15 +12 17	31
32	300005	30.4N 131.0E	7000M	1707		30 160	15 27N	100 160	15	5 5	CIRCULAR 9	+15 +12 17	32
33	300220	31.2N 131.4E	7000M	1702	954	100 250	20 14N	78 070	4N	5 5	CIRCULAR 10	+17 +18 +10 17	33
34	300901	32.2N 137.4E	7000M	1094	957	40 310	5 27N	60 360	2N	5 5		+16 +17 + 6 17	34

DATA FILES

FIL NO.	TIME (7)	FIL POSITION	RAJAR	ACRY	EYE SHAPE	EYE DIAM	RAJNO-CODE ASWAM	TDDFF	COMMENTS	MAJOR POSITION	MINOR NO.	
1	242100	27.34	120.3E	LAND			75//6	63310		26.24	127.0E	47997
2	242200	27.34	120.3E	LAND			76//2	53411		26.24	127.0E	47997
3	242300	27.34	120.2E	LAND			76//2	53411		26.24	127.0E	47997
4	242300	27.34	120.2E	LAND	PHOW					26.24	126.0E	47999
5	240000	27.34	120.2E	LAND			54//3	53308		26.24	127.0E	47997
6	240100	27.34	120.1E	LAND			55//3	52005		26.24	127.0E	47997
7	240100	27.34	120.0E	LAND	GRUD	70				26.24	126.0E	47999
8	240200	27.34	120.0E	LAND			65//3	53410		26.24	127.0E	47997
9	240200	27.34	120.0E	LAND	PHUM				EYE MNOVA 3225	26.14	127.7E	47997
10	240300	27.34	120.0E	LAND			65//2	501//		26.24	127.0E	47997
11	240300	27.34	120.0E	LAND	GRUD	70				26.14	127.0E	47997
12	240400	27.34	120.0E	LAND	PHUM	70			EYE MNOVA 3610	26.14	127.7E	47997
13	240500	27.34	120.0E	LAND			75//1	70204		26.24	127.0E	47997
14	240500	27.34	120.1E	LAND	GRUD	70			EYE MNOVA 3210	26.14	127.7E	47997
15	240500	27.34	120.1E	LAND	GRUD	70				26.14	127.7E	47997
16	240500	27.34	120.0E	LAND			55//1	70202		26.24	127.0E	47997
17	240700	27.34	120.2E	LAND			75//4	70404		26.24	127.0E	47997
18	240700	27.34	120.1E	LAND	GRUD	70				26.14	127.7E	47997
19	240900	27.34	120.1E	LAND	GRUD	70				26.14	127.7E	47997
20	240900	27.34	120.2E	LAND			70411	70603		26.24	127.0E	47997
21	240900	27.34	120.2E	LAND	GRUD	70			EYE MNOVA 0205	26.14	127.7E	47997
22	241000	27.34	120.2E	LAND	PHOR				EYE MNOVA 0205	26.14	127.7E	47997
23	241000	27.34	120.1E	LAND			70//1	53306		26.14	127.0E	47997
24	241100	27.34	120.1E	LAND			55//4	70504		26.24	127.0E	47997
25	241100	27.34	120.2E	LAND	PHOR				EYE STNR	26.14	127.7E	47997
26	241200	27.34	120.2E	LAND	PHUM				EYE STNR	26.14	127.7E	47997
27	241200	27.34	120.2E	LAND			75//1	73605		26.24	127.0E	47997
28	241300	27.34	120.2E	LAND	GRUD	70			EYE MNOVA 0205	26.14	127.7E	47997
29	241300	27.34	120.2E	LAND			55//1	70106		26.24	127.0E	47997
30	241400	27.34	120.1E	LAND			55//1	73606		26.24	127.0E	47997
31	241400	27.34	120.3E	LAND	GRUD	70			EYE MNOVA 0205	26.14	127.7E	47997
32	241500	27.34	120.1E	LAND	GRUD	70			EYE MNOVA 3610	26.14	127.7E	47997
33	241500	27.34	120.2E	LAND			54//1	70105		26.24	127.0E	47997
34	241500	27.34	120.2E	LAND			54//1	70105		26.24	127.0E	47997
35	241700	27.34	120.1E	LAND			71//1	73603		26.14	127.7E	47997
36	241700	27.34	120.1E	LAND	GRUD	70			EYE MNOVA 3610	26.14	127.7E	47997
37	241800	27.34	120.1E	LAND	GRUD	70			EYE MNOVA 3610	26.14	127.7E	47997
38	241900	27.34	120.3E	LAND			71//1	70204		26.24	127.0E	47997
39	241900	27.34	120.4E	LAND			71//1	70306		26.24	127.0E	47997

40	241300	24.44	129.3E	LAND	GRUU	20		EVE MNUK 0510	26.1M	127.7E	47337
41	242000	24.44	129.4E	LAND	GRUU	20		EVE MNUK 0510	26.1M	127.7E	47337
42	242100	24.44	129.4E	LAND			11/11 70200		26.1M	127.7E	47337
43	242100	24.44	129.5E	LAND			11/11 70400		26.1M	127.7E	47337
44	242100	24.44	129.5E	LAND	FAIR	45		EVE MNUK 0515	26.1M	127.7E	47337
45	242200	24.44	129.5E	LAND	FAIR	45		EVE MNUK 0515	26.1M	127.7E	47337
46	242200	24.44	129.5E	LAND			11/11 70200		26.1M	127.7E	47337
47	242300	24.44	129.5E	LAND	FAIR	45		EVE MNUK 0515	26.1M	127.7E	47337
48	270000	24.44	129.6E	LAND	GRUU	45		EVE MNUK 0515	26.1M	127.7E	47337
49	270000	24.44	129.5E	LAND			11/11 73000		26.1M	127.7E	47337
50	270000	24.44	129.5E	LAND			11/11 74000		26.1M	127.7E	47337
51	270100	24.44	129.5E	LAND			11/11 73000		26.1M	127.7E	47337
52	270100	24.44	129.6E	LAND			11/11 50211		26.1M	127.7E	47337
53	270100	24.44	129.6E	LAND	GRUU	45		EVE MNUK 3620	26.1M	127.7E	47337
54	270200	24.44	129.6E	LAND			11/11 53610		26.1M	127.7E	47337
55	270200	24.44	129.6E	LAND	GRUU	45		EVE MNUK 3610	26.1M	127.7E	47337
56	270200	24.44	129.5E	LAND			11/11 73000		26.1M	127.7E	47337
57	270300	24.44	129.6E	LAND	GRUU	45		EVE MNUK 3610	26.1M	127.7E	47337
58	270300	24.44	129.5E	LAND			11/11 53600		26.1M	127.7E	47337
59	270300	24.44	129.6E	LAND			11/11 53600		26.1M	127.7E	47337
60	270400	24.44	129.6E	LAND			11/11 73500		26.1M	127.7E	47337
61	270400	24.44	129.6E	LAND			11/11 53600		26.1M	127.7E	47337
62	270400	24.44	129.6E	LAND	GRUU	45		EVE MNUK 3610	26.1M	127.7E	47337
63	270500	24.44	129.3E	LAND			11/11 73600		26.1M	127.7E	47337
64	270500	24.44	129.6E	LAND			11/11 53600		26.1M	127.7E	47337
65	270510	24.44	129.6E	LAND	GRUU	45		EVE MNUK 3610	26.1M	127.7E	47337
66	270535	24.44	129.6E	LAND	GRUU	45		EVE MNUK 3610	26.1M	127.7E	47337
67	270600	24.44	129.6E	LAND			11/11 70200		26.1M	127.7E	47337
68	270600	24.44	129.6E	LAND			11/11 50000		26.1M	127.7E	47337
69	270610	24.44	129.5E	LAND	GRUU	45		EVE MNUK 3610	26.1M	127.7E	47337
70	270630	24.44	129.5E	LAND	GRUU	45		EVE MNUK 3610	26.1M	127.7E	47337
71	270700	24.44	129.6E	LAND			11/11 50100		26.1M	127.7E	47337
72	270700	24.44	129.7E	LAND	GRUU	45		EVE MNUK 3610	26.1M	127.7E	47337
73	270700	24.44	129.7E	LAND			11/11 70600		26.1M	127.7E	47337
74	270710	24.44	129.6E	LAND	GRUU	45		EVE MNUK 3610	26.1M	127.7E	47337
75	270900	24.44	129.7E	LAND	GRUU	45		EVE MNUK 3610	26.1M	127.7E	47337
76	270900	24.44	129.7E	LAND			11/11 70200		26.1M	127.7E	47337
77	270900	24.44	129.6E	LAND			11/11 53500		26.1M	127.7E	47337
78	270910	24.44	129.3E	LAND	GRUU	45		EVE MNUK 3610	26.1M	127.7E	47337
79	270940	24.44	129.3E	LAND	GRUU	45		EVE MNUK 3610	26.1M	127.7E	47337
80	270900	24.44	129.7E	LAND			11/11 70200		26.1M	127.7E	47337
81	270900	24.44	129.7E	LAND			11/11 50200		26.1M	127.7E	47337
82	270900	24.44	129.6E	LAND	GRUU	45		EVE MNUK 3615	26.1M	127.7E	47337
83	270910	24.44	129.4E	LAND	GRUU	45		EVE MNUK 3615	26.1M	127.7E	47337
84	270940	24.44	129.4E	LAND	GRUU	45		EVE MNUK 3615	26.1M	127.7E	47337
85	271000	24.44	129.7E	LAND			11/11 50000		26.1M	127.7E	47337
86	271000	24.44	129.6E	LAND	GRUU	45		EVE MNUK 3610	26.1M	127.7E	47337
87	271000	24.44	129.7E	LAND			11/11 73600		26.1M	127.7E	47337
88	271035	24.44	129.6E	LAND	GRUU	45		EVE MNUK 3610	26.1M	127.7E	47337
89	271100	24.44	129.8E	LAND	GRUU	45		EVE MNUK 3610	26.1M	127.7E	47337
90	271100	24.44	129.8E	LAND			11/11 70500		26.1M	127.7E	47337
91	271100	24.44	129.8E	LAND			11/11 50600		26.1M	127.7E	47337
92	271200	24.44	129.7E	LAND	GRUU	45		EVE MNUK 3620	26.1M	127.7E	47337
93	271200	24.44	129.8E	LAND			11/11 70100		26.1M	127.7E	47337
94	271300	24.44	129.7E	LAND			11/11 73500		26.1M	127.7E	47337
95	271300	24.44	129.7E	LAND	GRUU	45		EVE MNUK 3615	26.1M	127.7E	47337
96	271400	24.44	129.7E	LAND	GRUU	45		EVE MNUK 3615	26.1M	127.7E	47337
97	271400	24.44	129.6E	LAND			11/11 73300		26.1M	127.7E	47337
98	271400	24.44	129.6E	LAND			11/11 53011		26.1M	127.7E	47337
99	271500	24.44	129.7E	LAND			11/11 73500		26.1M	127.7E	47337
100	271500	24.44	129.6E	LAND			11/11 53600		26.1M	127.7E	47337
101	271600	24.44	129.7E	LAND			11/11 73600		26.1M	127.7E	47337
102	271600	24.44	129.6E	LAND			11/11 53611		26.1M	127.7E	47337
103	271600	24.44	129.7E	LAND			11/11 53611		26.1M	127.7E	47337
104	271700	24.44	129.7E	LAND	GRUU	45		EVE MNUK 3615	26.1M	127.7E	47337
105	271700	24.44	129.8E	LAND	GRUU	45		EVE MNUK 0410	26.1M	127.7E	47337
106	271700	24.44	129.8E	LAND			11/11 70200		26.1M	127.7E	47337
107	271900	24.44	129.8E	LAND	GRUU	45		EVE MNUK 0510	26.1M	127.7E	47337
108	271900	24.44	129.7E	LAND			11/11 70100		26.1M	127.7E	47337
109	271900	24.44	129.7E	LAND			11/11 53600		26.1M	127.7E	47337
110	271900	24.44	129.7E	LAND			11/11 53600		26.1M	127.7E	47337
111	271900	24.44	129.6E	LAND			11/11 73500		26.1M	127.7E	47337
112	271900	24.44	129.8E	LAND	GRUU	45		EVE MNUK 0305	26.1M	127.7E	47337
113	272000	24.44	129.7E	LAND			11/11 73500		26.1M	127.7E	47337
114	272000	24.44	129.7E	LAND	GRUU	45		EVE MNUK 0305	26.1M	127.7E	47337
115	272100	24.44	129.8E	LAND	GRUU	45		EVE MNUK 0310	26.1M	127.7E	47337
116	272100	24.44	129.7E	LAND			11/11 73600		26.1M	127.7E	47337
117	272200	24.44	129.8E	LAND			11/11 50200		26.1M	127.7E	47337
118	272200	24.44	129.8E	LAND	FAIR	45		EVE MNUK 3610	26.1M	127.7E	47337
119	272300	24.44	129.8E	LAND	GRUU	45		EVE MNUK 3615	26.1M	127.7E	47337
120	272300	24.44	129.8E	LAND			11/11 53611		26.1M	127.7E	47337
121	280000	24.44	129.8E	LAND			11/11 50000		26.1M	127.7E	47337
122	280000	24.44	129.8E	LAND	GRUU	45		EVE MNUK 3610	26.1M	127.7E	47337
123	280035	24.44	129.3E	LAND	GRUU	45		EVE MNUK 3610	26.1M	127.7E	47337
124	280110	24.44	129.4E	LAND	FAIR	45		EVE MNUK 3610	26.1M	127.7E	47337
125	280135	24.44	129.8E	LAND	FAIR	45		EVE MNUK 3610	26.1M	127.7E	47337
126	280200	24.44	129.8E	LAND			11/11 53100		26.1M	127.7E	47337

127	200210	27.44	120.8E	LAND	FAIR					26.4N	127.8E	47931
128	200210	27.44	120.7E	LAND	GOOD					26.1N	127.7E	47932
129	200300	27.14	120.8E	LAND	GOOD	45	AN///	53503	EVE	MNVR	3510	47933
130	200300	27.24	120.8E	LAND	GOOD	40			EVE	MNVR	3610	47934
131	200310	27.54	120.4E	LAND	POOR					27.4N	120.7E	47935
132	200400	27.24	120.7E	LAND	GOOD	40			EVE	MNVR	3205	47936
133	200400	27.24	120.7E	LAND			21871	70601				47937
134	200400	27.14	120.6E	LAND			AN///	50203				47938
135	200500	27.34	120.8E	LAND			20711	70502				47939
136	200500	27.34	120.8E	LAND			AN///	50308				47940
137	200500	27.34	120.8E	LAND	GOOD	40			EVE	MNVR	3605	47941
138	200600	27.44	120.8E	LAND	GOOD	40			EVE	MNVR	3605	47942
139	200600	27.44	120.8E	LAND			57111	70204				47943
140	200700	27.44	120.9E	LAND			AN///	50803				47944
141	200700	27.44	120.8E	LAND	GOOD	40			EVE	MNVR	3605	47945
142	200800	27.44	120.9E	LAND	GOOD	40			EVE	MNVR	0305	47946
143	200900	27.44	120.9E	LAND			AN///	53304				47947
144	200935	27.44	120.7E	LAND	GOOD					26.4N	127.8E	47948
145	200900	27.54	120.4E	LAND			55111	50103				47949
146	200900	27.54	120.4E	LAND	GOOD	20			EVE	STNR		47950
147	200910	27.54	120.8E	LAND	FAIR					27.4N	128.7E	47951
148	200935	27.54	120.8E	LAND	FAIR					26.4N	127.8E	47952
149	201000	27.54	120.4E	LAND	GOOD	25			EVE	MNVR	0505	47953
150	201000	27.54	120.4E	LAND			55111	53604				47954
151	201010	27.54	120.5E	LAND	POOR					26.4N	127.8E	47955
152	201035	27.44	120.7E	LAND	GOOD					26.4N	127.8E	47956
153	201100	27.44	120.9E	LAND	GOOD	25			EVE	MNVR	3610	47957
154	201110	27.54	120.7E	LAND	FAIR					26.4N	127.8E	47958
155	201200	27.54	120.8E	LAND			55111	52004				47959
156	201210	27.44	120.9E	LAND	GOOD	25			EVE	STNR		47960
157	201300	27.54	120.8E	LAND			55111	52003				47961
158	201330	27.54	120.9E	LAND	GOOD	25			EVE	MNVR	3205	47962
159	201400	27.54	120.4E	LAND	GOOD	20			EVE	MNVR	3605	47963
160	201400	27.44	120.8E	LAND			55111	51203				47964
161	201435	27.44	120.4E	LAND	GOOD	20			EVE	MNVR	3605	47965
162	201600	27.54	120.4E	LAND			55111	53404				47966
163	201615	27.44	120.9E	LAND	GOOD	20			EVE	STNR		47967
164	201700	27.44	120.8E	LAND			55111	53302				47968
165	201700	27.74	120.4E	LAND	GOOD	20			EVE	STNR		47969
166	201900	27.44	120.8E	LAND	GOOD	20			EVE	MNVR	3610	

229	201900	20.40	130.5E	LAND		21771	50100				30.6N	131.0E	47949
230	201900	20.30	130.7E	LAND		21771	50111				30.6N	131.0E	47949
231	201900	20.30	130.7E	LAND		21661	50300				28.4N	129.5E	47909
232	201900	20.40	130.7E	LAND	G700				EVE	MNVR 0320	TAKAHATA		
233	202000	20.10	130.6E	LAND	G700				EVE	MNVR 0420	TAKAHATA		
234	202000	20.10	130.6E	LAND		45771	50210				28.4N	129.5E	47909
235	202000	20.20	130.9E	LAND		21571	50310				30.6N	131.0E	47949
236	202100	20.30	130.9E	LAND		21571	50100				30.6N	131.0E	47949
237	202100	20.30	131.0E	LAND		45771	50211				28.4N	129.5E	47909
238	202100	20.30	130.9E	LAND	G700				EVE	MNVR 0420	TAKAHATA		
239	202200	20.30	131.1E	LAND		45771	50200				28.4N	129.5E	47909
240	202200	20.40	131.1E	LAND		21571	50010				30.6N	131.0E	47949
241	202300	20.50	131.2E	LAND		45771	50310				28.4N	129.5E	47909
242	202300	20.40	131.4E	LAND		10001	50410				30.6N	131.0E	47949
243	202300	20.40	131.4E	LAND	G700				EVE	MNVR 0520	STOKOSIKI		
244	202300	20.40	131.5E	LAND	G700				EVE	MNVR 0530	STOKOSIKI		
245	202300	20.40	131.6E	LAND		45771	50410				30.6N	131.0E	47949
246	202300	21.00	131.7E	LAND	G700				EVE	MNVR 0524	STOKOSIKI		
247	202300	21.30	131.9E	LAND		20771	50310				30.6N	131.0E	47949
248	202300	21.40	131.9E	LAND		45712	57777				33.4N	130.3E	47906
249	202300	21.30	131.9E	LAND	G700				EVE	MNVR 0530	STOKOSIKI		
250	202300	21.40	132.0E	LAND		45771	57777				33.3N	130.2E	47909
251	202300	21.50	131.9E	LAND		45712	50411				33.4N	130.3E	47906
252	202300	21.50	132.2E	LAND					EVE	MNVR 0530	STOKOSIKI		
253	202300	21.50	132.2E	LAND	G700				EVE	MNVR 0645	KJS+TMOTO		
254	202300	21.50	132.2E	LAND		45771	50410				30.6N	131.0E	47949
255	202300	21.70	132.3E	LAND		45771	50410				30.6N	131.0E	47949
256	202300	21.80	132.4E	LAND					EVE	MNVR 0550	SEBURI		
257	202300	21.80	132.5E	LAND	G700				45772	50010	33.4N	130.3E	47906
258	202300	21.90	132.2E	LAND		45771	50420				33.3N	130.2E	47909
259	202300	21.70	132.3E	LAND		45771	50420				30.6N	131.0E	47949
260	202300	22.00	132.7E	LAND		45771	50520						
261	202300	22.10	132.7E	LAND	G700				EVE	MNVR 0540	SEBURI		
262	202300	22.00	132.7E	LAND		10501	50520				33.3N	130.2E	47909
263	202300	22.30	132.7E	LAND		45771	50430				33.4N	130.3E	47906
264	202300	22.20	132.8E	LAND		10011	50520				32.1N	131.5E	47854
265	202300	22.20	132.8E	LAND	G700				45771	50510	33.3N	130.2E	47909
266	202300	22.30	132.9E	LAND					EVE	MNVR 0540	SEBURI		
267	202300	22.20	132.1E	LAND		20010	50320				33.3N	132.6E	47792
268	202300	22.20	132.9E	LAND	G700				EVE	MNVR 0540	SEBURI		
269	202300	22.20	133.0E	LAND					EVE	MNVR 0155	KJS+TMOTO		
270	202300	22.30	133.0E	LAND	G700				EVE	MNVR 0540	SEBURI		
271	202300	22.20	132.7E	LAND					EVE	MNVR 0150	KJS+TMOTO		
272	202300	22.40	132.7E	LAND	G700				EVE	MNVR 0150	KJS+TMOTO		
273	202300	22.40	132.2E	LAND		10511	50520				34.3N	132.6E	47792
274	202300	22.50	132.6E	LAND		20010	50520				34.3N	132.6E	47792
275	202300	22.50	132.2E	LAND		20010	50520				33.3N	130.2E	47909
276	202300	22.90	132.7E	LAND		20010	50520						
277	202300	22.90	132.6E	LAND		20010	50520						
278	202300	23.00	132.7E	LAND	G700				EVE	MNVR 0540	SEBURI		
279	202300	23.10	132.0E	LAND		20010	50520				33.3N	130.2E	47909
280	202300	23.10	132.9E	LAND		45771	50520				34.3N	132.6E	47792
281	202300	23.10	132.9E	LAND	G700				EVE	MNVR 0540	SEBURI		
282	202300	23.10	132.0E	LAND		20010	50520				33.3N	130.2E	47909
283	202300	23.40	132.3E	LAND		45771	50520				34.3N	132.6E	47792
284	202300	23.30	132.2E	LAND		45771	50520				35.3N	138.7E	47679
285	202300	23.40	132.4E	LAND		45771	50520				34.3N	132.6E	47792
286	202300	23.20	132.9E	LAND		45771	50710				35.3N	138.7E	47679
287	202300	23.50	132.5E	LAND		45771	50420				34.3N	132.6E	47792
288	202300	23.90	132.8E	LAND		20010	50520				33.3N	130.2E	47909
289	202300	23.40	132.6E	LAND		45771	50520				35.3N	138.7E	47679
290	202300	23.40	132.5E	LAND		10511	50520				34.6N	135.7E	47773
291	202300	23.40	132.7E	LAND		45771	50520						
292	202300	23.70	132.7E	LAND		45771	50520				35.3N	138.7E	47679
293	202300	23.40	132.1E	LAND		20010	50520				33.3N	130.2E	47909
294	202300	24.00	132.8E	LAND		20010	50520				34.6N	135.7E	47773
295	202300	24.10	132.0E	LAND		45771	50520				35.3N	138.7E	47679
296	202300	24.40	132.0E	LAND		20010	50520				26.2N	127.0E	47977
297	202300	24.20	132.2E	LAND		20010	50520						
298	202300	24.10	132.0E	LAND		20010	50520				34.6N	135.7E	47773
299	202300	24.20	132.0E	LAND		20010	50520				34.6N	135.7E	47773
300	202300	24.30	132.7E	LAND		20010	50520				35.3N	138.7E	47679
301	202300	24.40	132.6E	LAND		20010	50520						
302	202300	24.50	132.5E	LAND		20010	50520						
303	202300	25.00	132.2E	LAND		20010	50520				34.6N	135.7E	47773
304	202300	25.00	132.1E	LAND		20010	50520						
305	202300	25.20	132.0E	LAND		20010	50520				35.3N	138.7E	47679
306	202300	25.00	132.6E	LAND		20010	50520				37.4N	135.9E	47600
307	202300	25.40	132.7E	LAND		20010	50520				34.6N	135.7E	47773
308	202300	25.40	132.2E	LAND		20010	50520				34.6N	135.7E	47773
309	202300	25.50	132.3E	LAND		20010	50520				37.4N	135.9E	47600
310	202300	25.40	132.2E	LAND		20010	50520				35.3N	138.7E	47679
311	202300	25.10	131.3E	LAND	G700				EVE	MNVR 0595	YAMADA		
312	202300	25.50	131.3E	LAND	G700				EVE	MNVR 3110	YAMADA		

# SYNOPTIC STAGES

FILE NO.	TIME (Z)	POS. POSITION	INTENSITY ESTIMATE	W. AREST DATA (NM)	COMMENTS
1	190000	15.00	142.0E	10	200
2	191200	15.50	142.5E	10	200
3	200000	15.00	144.0E	10	150
4	201200	15.00	142.0E	10	200
5	210000	15.50	140.5E	15	200
6	211200	15.00	134.0E	15	150
7	211500	15.30	132.0E	15	150
8	220000	15.00	138.0E	20	150

## TROPICAL STORM PAMELA

## SATELLITE FIXES

FIX NO.	TIME (Z)	FIX POSITION	ACRY	UVZAK CODE	SATELLITE	COMMENTS	SITE
1	232250	14.50 144.3E	PCN 5	T0.0/0.0	DMSD1A	INIT JDS	PGTW
2	242232	14.40 143.9E	PCN 5	T2.0/2.0 /02.0/24HRS	DMSD1A	EXPUSED ILCC	PGTW
3	240457	14.00 141.4E	PCN 5		DMSD17		PGTW
4	241114	14.00 143.3E	PCN 5		DMSD1A		PGTW
5	242147	20.40 130.2E	PCN 5		DMSD17		PGTW
6	240146	21.20 130.4E	PCN 3	T1.5/2.0 /00.5/27HRS	DMSD1A	EXPUSED ILCC	PGTW
7	240146	21.20 130.4E	PCN 5	T1.0/1.0	DMSD1A	INIT JDS	RPMK
8	241015	21.20 137.9E	PCN 3		DMSD17		PGTW
9	241246	24.30 137.6E	PCN 3		DMSD1A		PGTW

## AIRCRAFT FIXES

FIX NO.	TIME (Z)	FIX POSITION	FLY LVL	70042 DRS	MAX-SFC-WIND VEL/HRG/MNS	MAX-FLY-LVL-WIND VEL/HRG/MNS	ACRY	EYE SHAPE	EYE ORIENTATION	EYE TEMP (C)	WV DP/SEC
1	250927	14.40 142.1E	700MM	3151	1004	50 100 35 140	50 100 35 3 3			+10 + 7	
2	252222	20.40 140.1E	1500FT	1004	25 050	30 110 16 050	30 5 5			+20 +22 +21	
3	242258	20.40 140.1E	700MM	3129	20 160	50 120 20 360	60			+11 + 7	
4	240307	21.20 134.5E	1500FT		1003	25 060	50 140 17 100	60		5 10	
5	240504	21.40 137.4E	1500FT		1003	15 150 20 220	21 110 40 10 5			+20 +25 + 8	10

## TROPICAL STORM ROGER

## SATELLITE FIXES

FIX NO.	TIME (Z)	FIX POSITION	ACRY	UVZAK CODE	SATELLITE	COMMENTS	SITE
1	021233	13.50 135.7E	PCN 5		DMSD10		PGTW
2	031213	14.10 134.6E	PCN 5		DMSD1A		PGTW
3	032036	20.40 134.9E	PCN 5		DMSD17		PGTW
4	032313	20.40 134.4E	PCN 5	T1.0/1.0 /50.0/24HRS	DMSD1A		PGTW
5	040055	21.40 135.7E	PCN 5		DMSD10		PGTW
6	040055	20.40 135.6E	PCN 5	T1.5/1.5	DMSD1A	INIT JDS	RPMK
7	040917	21.40 135.2E	PCN 5		DMSD17		PGTW
8	041154	21.70 137.4E	PCN 5		DMSD1A		RODN
9	041155	21.40 137.5E	PCN 5		DMSD1A		PGTW
10	042157	20.40 137.1E	PCN 6	T2.0/2.0 /01.0/27HRS	DMSD17		PGTW
11	042158	20.40 137.6E	PCN 5	T1.5/1.5	DMSD17	INIT JDS	RODN
12	050036	20.40 137.8E	PCN 6		DMSD1A		PGTW
13	050217	20.40 137.3E	PCN 6		DMSD10	EDGE OF DATA	PGTW
14	050217	20.40 137.5E	PCN 5		DMSD1A		RPMK
15	050317	20.40 137.3E	PCN 5		DMSD1A		RODN
16	051317	21.70 134.6E	PCN 3		DMSD10	EXPUSED ILCC	PGTW
17	051317	21.70 135.6E	PCN 3		DMSD1A		RODN
18	051317	21.40 135.7E	PCN 5		DMSD10		RKSD
19	051319	21.40 135.4E	PCN 5		DMSD1A		RPMK
20	051319	21.40 135.7E	PCN 3		DMSD1A		PGTW
21	052137	23.40 134.9E	PCN 5	T1.0/2.0 /01.0/24HRS	DMSD17		PGTW
22	060119	23.40 135.0E	PCN 5		DMSD1A		PGTW
23	060158	24.40 135.0E	PCN 5	T3.0/3.0	DMSD10	INIT JDS	RPMK
24	060158	24.10 135.1E	PCN 5		DMSD10		PGTW
25	060158	24.20 135.0E	PCN 5	T3.0/3.0	DMSD1A	INIT JDS	RKSD
26	061017	24.40 134.6E	PCN 5		DMSD17		RKSD
27	061018	24.40 134.2E	PCN 5		DMSD17		RPMK
28	061915	24.00 134.6E	PCN 5		DMSD17		PGTW
29	061257	27.30 134.4E	PCN 5		DMSD10		RKSD
30	061301	27.10 135.1E	PCN 5		DMSD1A		PGTW
31	061301	26.40 135.4E	PCN 5		DMSD1A		RPMK
32	062117	29.00 136.3E	PCN 6		DMSD17		PGTW

# AIRCRAFT FIXES

FIX NO.	TIME (Z)	FIX POSITION	FLT LVL	TUOMH HGT	OBS MSLP	MAX-SFC-WND VEL/ANG/ANG	MAX-FLT-LVL-WND MIN/VEL/DIR/ANG	ACCRV NAV/MFT	EYE SHAPE	EYE ORIENT- DIAM/TATION	EYE TEMP (C) DIR/ IN/ DP/SLT	WSN NO.
1	010220	14.1N 144.2E	1500F1		998	40 180 40	240 30 160 60	5 5			+24 +24 +24 28	2
2	040308	21.1N 134.7E	1500F1		982	35 080 10	140 35 080 10	3 3			+24 +24 +24 28	3
3	040305	21.2N 134.1E	1500F1		987	40 030 25	100 40 030 25	2 5			+24 +24 +24 28	4
4	041420	20.4N 134.5E	700MM	3003			130 32 210 60	4 5			+19 +11	5
5	042125	20.4N 134.7E	700MM	3015	992	35 180 10	040 36 320 45	5 3			+11 +19 + 6	5
6	040124	24.1N 144.5E	700MM	3001		40 220 30	140 48 120 85	5 5			+14 +12 +10	6

# SYNOPTIC FIXES

FIX NO.	TIME (Z)	FIX POSITION	INTENSITY ESTIMATE	NEAREST DATA (NM)	COMMENTS
1	010000	13.0N 141.1E	20	120	
2	011400	13.1N 134.0E	20	240	
3	020000	12.7N 142.0E	20	210	
4	040000	24.0N 134.5E	40	10	
5	041200	27.0N 134.5E	45	70	
6	070000	17.5N 137.0E	35	190	

TYPHOON SARAH

SATELLITE FIXES

FLA NO.	TIME (Z)	FIX POSITION	ACQRY	UNUSAK CODE	SATELLITE	COMMENTS	SITE
* 1	012259	16.20 121.0E	PCN 5	T1.0/1.0	DWSP47	INIT JMS	RODN
* 2	020131	16.20 122.0E	PCN 5	T0.0/0.0	DWSP46	INIT JMS	RPNK
* 3	021134	16.20 120.0E	PCN 5		DWSP40		RPNK
* 4	021412	16.20 120.0E	PCN 5		DWSP40		RPNK
* 5	021416	16.20 120.1E	PCN 5		DWSP40		RODN
* 6	022236	16.20 121.7E	PCN 5	T0.0/0.0 /50.0/21HRS	DWSP47		RPNK
* 7	030113	16.20 110.0E	PCN 5	T1.0/1.0 /50.0/24HRS	DWSP46		RODN
* 8	030255	16.20 110.0E	PCN 5		DWSP40		RPNK
* 9	031355	16.20 120.0E	PCN 5		DWSP40		RODN
* 10	031355	16.20 110.2E	PCN 5		DWSP46		RPNK
* 11	042218	16.20 110.0E	PCN 5	T0.0/0.0 /50.0/24HRS	DWSP47		RPNK
* 12	040055	16.20 110.1E	PCN 5	T2.0/2.0 /01.0/24HRS	DWSP46		RODN
* 13	040235	16.20 110.0E	PCN 5		DWSP40		RPNK
* 14	041058	16.20 110.0E	PCN 5		DWSP47		RODN
* 15	041336	16.20 111.0E	PCN 5		DWSP40		RPNK
* 16	041337	16.20 110.0E	PCN 5		DWSP46		PGTW
* 17	042157	16.20 110.3E	PCN 5		DWSP40		PGTW
* 18	050036	16.20 110.1E	PCN 5		DWSP46		PGTW
* 19	050036	16.20 110.1E	PCN 5		DWSP47		PGTW
* 20	050217	16.20 110.0E	PCN 5	T2.0/2.0	DWSP40	INIT JMS	PGTW
* 21	050217	16.20 110.2E	PCN 5	T1.5/1.5 /01.5/24HRS	DWSP40		RPNK
* 22	050217	16.20 110.1E	PCN 5	T2.5/2.5 /00.5/25HRS	DWSP40		RODN
* 23	051036	16.20 110.2E	PCN 6		DWSP47		PGTW
* 24	051317	16.20 110.0E	PCN 6		DWSP40		PGTW
* 25	051317	16.20 110.7E	PCN 5		DWSP40		RODN
* 26	051319	16.20 110.2E	PCN 5		DWSP46		PGTW
* 27	051319	16.20 110.2E	PCN 5		DWSP46		RPNK
* 28	052319	16.20 110.0E	PCN 5		DWSP47		RODN
* 29	052319	16.20 110.7E	PCN 5		DWSP47		RPNK
* 30	060016	16.20 110.9E	PCN 5		DWSP46		PGTW
* 31	060158	16.20 110.7E	PCN 5	T2.0/2.0 /50.0/24HRS	DWSP40		PGTW
* 32	060158	16.20 110.5E	PCN 5	T1.0/1.5 /00.5/24HRS	DWSP40		RPNK
* 33	061018	16.20 110.3E	PCN 5		DWSP47		RPNK
* 34	061018	16.20 110.9E	PCN 5		DWSP47		PGTW
* 35	061301	16.20 110.1E	PCN 5		DWSP46		RPNK
* 36	061301	16.20 110.0E	PCN 5		DWSP46		PGTW
* 37	061639	16.20 110.0E	PCN 5		DWSP40		RODN
* 38	061639	16.20 110.2E	PCN 5		DWSP40		RPNK
* 39	062259	16.20 110.2E	PCN 3	T2.0/2.0 /01.0/21HRS	DWSP46		RPNK
* 40	062259	16.20 120.0E	PCN 5	T2.5/2.5	DWSP47	INIT JMS	RODN
* 41	070138	16.20 110.3E	PCN 3	T2.5/2.5 /00.5/24HRS	DWSP40		PGTW
* 42	070139	16.20 110.3E	PCN 3		DWSP40		RODN
* 43	070143	16.20 110.3E	PCN 5		DWSP46		RPNK
* 44	070240	16.20 110.1E	PCN 5		DWSP40		RPNK
* 45	071139	16.20 110.3E	PCN 5		DWSP47		RPNK
* 46	071139	16.20 110.2E	PCN 5		DWSP47		RODN
* 47	071202	16.20 110.4E	PCN 5		DWSP46		RPNK
* 48	071203	16.20 110.3E	PCN 5		DWSP46		PGTW
* 49	071420	16.20 110.3E	PCN 5		DWSP40		RODN
* 50	072238	16.20 110.3E	PCN 5	T3.0/3.5 /00.5/24HRS	DWSP47		RPNK
* 51	072238	16.20 110.2E	PCN 5		DWSP47		RODN
* 52	080126	16.20 110.3E	PCN 5		DWSP46		RPNK
* 53	080301	16.20 110.5E	PCN 3	T3.0/3.0 /00.5/24HRS	DWSP40		RODN
* 54	081118	16.20 110.0E	PCN 5		DWSP47	PSN CYR OF CON	RPNK
* 55	081118	16.20 110.3E	PCN 5		DWSP47	NU LYE/PSN BASED ON 2 CR BANDS	RODN
* 56	081406	16.20 110.2E	PCN 5		DWSP46	CI UP/JUTFLOW INCREASED	RPNK
* 57	081406	16.20 110.3E	PCN 5		DWSP46		RODN
* 58	082218	16.20 110.2E	PCN 5	T4.0/4.0 /01.5/21HRS	DWSP47		PGTW
* 59	082218	16.20 110.1E	PCN 5	T4.0/4.0 /01.0/24HRS	DWSP47		RPNK
* 60	090107	16.20 110.0E	PCN 1	T4.5/4.5 /01.5/24HRS	DWSP46		RODN
* 61	090242	16.20 110.0E	PCN 3		DWSP40		RPNK
* 62	091058	16.20 117.5E	PCN 1		DWSP47		RPNK
* 63	091059	16.20 117.4E	PCN 1		DWSP47		RODN
* 64	091342	16.20 117.1E	PCN 1		DWSP40		PGTW
* 65	091342	16.20 117.4E	PCN 1		DWSP40		RODN
* 66	091348	16.20 117.3E	PCN 1		DWSP46		RPNK
* 67	092158	16.20 116.5E	PCN 1		DWSP47		RPNK
* 68	100049	16.20 116.2E	PCN 1	T5.0/5.0 /01.0/24HRS	DWSP46		RPNK
* 69	100049	16.20 116.4E	PCN 1	T5.0/5.0 /01.0/24HRS	DWSP46		PGTW
* 70	100223	16.20 116.4E	PCN 1	T5.5/5.5 /01.0/25HRS	DWSP40		RODN
* 71	101038	16.20 116.1E	PCN 1		DWSP47		RPNK
* 72	101038	16.20 116.0E	PCN 1		DWSP40		RODN
* 73	101038	16.20 116.1E	PCN 1		DWSP47		PGTW
* 74	101331	16.20 116.0E	PCN 1		DWSP46		RPNK
* 75	101331	16.20 116.0E	PCN 2		DWSP46		RODN
* 76	101504	16.20 116.0E	PCN 6		DWSP40	ESTIMATE CNTR OFF EDGE OF DATA	RPNK
* 77	102319	16.20 116.7E	PCN 3	T5.0/5.0 /50.0/24HRS	DWSP47		RPNK
* 78	102319	16.20 116.0E	PCN 3	T4.5/5.5 /01.0/21HRS	DWSP47		RODN
* 79	110031	16.20 116.5E	PCN 3		DWSP46		RPNK
* 80	110204	16.20 116.2E	PCN 3	T4.5/5.0 /00.5/24HRS	DWSP40		PGTW
* 81	111018	16.20 116.0E	PCN 5		DWSP47		RPNK
* 82	111159	16.20 116.2E	PCN 6		DWSP47		PGTW
* 83	111312	16.20 116.7E	PCN 3		DWSP46		RPNK
* 84	111445	16.20 116.3E	PCN 3		DWSP40		PGTW
* 85	111445	16.20 116.3E	PCN 5		DWSP40		RODN
* 86	112258	16.20 116.4E	PCN 3		DWSP47		RODN
* 87	120150	16.20 116.0E	PCN 5	T4.5/5.0 /00.5/24HRS	DWSP46		RPNK
* 88	120154	16.20 116.3E	PCN 5	T3.5/4.5 /01.0/24HRS	DWSP46		RODN
* 89	120326	16.20 116.0E	PCN 5		DWSP40		RPNK

90	121139	13.30	117.0E	PCN 3		DM5037	RPMK
91	121426	13.40	117.4E	PCN 3		DM5030	RPMK
92	121426	13.40	117.4E	PCN 5		DM5030	ROUN
93	122238	13.00	117.3E	PCN 5		DM5037	RPMK
94	122238	13.20	117.5E	PCN 3		DM5037	ROUN
95	130136	13.10	117.4E	PCN 5	T3.5/4.5 /W1.0/24HRC	DM5030	RPMK
96	130307	13.20	117.3E	PCN 1		DM5030	RPMK
97	130307	13.30	117.4E	PCN 1	T5.0/5.0 /D1.5/24HRC	DM5030	ROUN
98	131119	13.40	111.7E	PCN 3		DM5037	RPMK
99	131119	13.40	111.7E	PCN 3		DM5037	ROUN
100	131401	13.40	111.6E	PCN 3		DM 037	ROUN
101	131407	13.70	111.1E	PCN 3		DM5030	RPMK
102	140118	13.50	110.7E	PCN 5	T2.5/3.5 /W1.0/24HRC	DM5030	RPMK
103	140248	13.40	110.7E	PCN 3		DM5030	RPMK
104	140248	13.30	110.7E	PCN 3	T4.0/5.0-/W1.0/24HRC	DM5030	ROUN
105	141058	12.30	100.0E	PCN 5		DM5037	ROUN
106	141058	13.30	100.5E	PCN 3		DM5037	RPMK
107	141348	13.20	100.2E	PCN 5		DM5030	PGTW
108	141348	13.00	100.6E	PCN 5		DM5030	ROUN
109	141359	13.10	100.2E	PCN 3		DM5030	RPMK
110	142339	13.20	100.7E	PCN 5	T1.5/2.5 /W1.0/24HRC	DM5037	RPMK
111	140229	13.30	107.9E	PCN 5		DM5030	RPMK
112	140229	12.30	107.5E	PCN 5	T2.0/3.0-/W2.0/24HRC	DM5030	ROUN

#### ATCRAFT FIXES

FIX NO.	TIME (Z)	FIX POSITION	FLT LVL	TUOHZ MGT	OBS MSLP	MAX-SFC-WND VEL/RRG/RNG	MAX-FLT-LVL-WND DTN/VEL/SHU/MNG	ACFTY NAV/MET	EYE SHAPE	EYE ORIENT- DIAM/TATION	EYE TEMP (C) DUTY /W/ DP/ST	WSN NO.
1	041001	12.60	110.3E	T00MH	3017	991	65 360 50 340 35 270 30	3 4			+10 +17 + 7	1
2	040342	12.60	110.7E	T00MH	3054	996	40 010 50 130 32 010 30	3 4	CIRCULAR	20	+13 +13 + 5	3
3	070203	12.20	110.4E	T00MH	2994		50 030 11 040 50 360 15	3 5	CIRCULAR	20	+13 + 3	4
4	070431	12.20	110.3E	T00MH	2970	985	75 330 10 340 73 270 10	3 4	CIRCULAR	20	+11 +15 + 5	4
5	080210	11.30	110.2E	T00MH	2920	982	75 300 20 120 78 300 20	4 4	CIRCULAR	10	+11 +12 + 8	5
6	080312	11.10	110.2E	T00MH	2927	980	45 080 5 320 40 220 30	3 4	CIRCULAR	R	+11 +15 + 9	5
7	090405	11.30	117.9E	T00MH	2761	960	40 140 10 100 101 040 20	4 4	CIRCULAR	20	+11 +13 + 8	6
8	100142	11.50	116.5E	T00MH	2496		100 060 5 150 93 060 10	4 2	CIRCULAR		+25 +10	7
9	100422	11.70	116.4E	T00MH	2489	929	100 180 7 070 115 020 5	4 1	CIRCULAR	15	+11 +25 + 4	7
10	110131	12.00	115.4E	T00MH	2737		50 070 50 120 73 060 12	4 2				8
11	110343	12.00	115.2E	T00MH	2733	959	65 130 25 040 74 320 14	4 2	CIRCULAR	12	+10 +13 +11	8
12	120700	12.00	117.6E	T00MH	2785		65 080 20 240 70 160 50	4 4	CIRCULAR			9
13	120923	13.10	117.4E	T00MH	2784	962	45 180 30 110 63 040 20	4 4			+14 +15 + 6	9

#### RAJAH FIXES

FIX NO.	TIME (Z)	FIX POSITION	RAJAH ACFTY	EYE SHAPE	EYE DIAM	RAJAH-CODE ASWAN TOOFF	COMMENTS	RAJAH POSITION	SITE WND NO.	
1	041208	14.10	119.7E	LAND				16.30	120.6E	08321
2	041300	13.40	110.8E	LAND	CIRCULAR			16.30	120.6E	08321
3	041308	14.00	110.5E	LAND				16.30	120.6E	08321
4	041800	13.40	110.2E	LAND				16.30	120.6E	08321
5	040000	13.50	110.0E	LAND				13.70	100.6E	08455

#### SYNOPTIC FIXES

FIX NO.	TIME (Z)	FIX POSITION	INTENSITY ESTIMATE	NEAREST DATA (NM)	COMMENTS
1	011200	14.50	120.5E	10	60
2	020000	15.00	121.0E	10	90
3	030000	15.00	121.0E	10	60
4	041200	14.00	119.8E	15	90

SUPER TYPHOON TIP

SATELLITE FIXES

FIX NO.	TIME (Z)	FIX POSITION	ACQRY	UVIRAK CODE	SATELLITE	COMMENTS	SITE
1	041154	14.2N 152.4E	PCN 5		DMSP14		PGTW
2	042016	14.5N 152.7E	PCN 6	T1.0/1.0	DMSP17	INIT JDS	PGTW
3	042255	14.7N 152.7E	PCN 6		DMSP1A		PGTW
4	043557	14.7N 152.4E	PCN 6		DMSP17		PGTW
5	044137	14.7N 152.4E	PCN 5		DMSP17		PGTW
6	044955	14.7N 152.4E	PCN 6		DMSP17		PGTW
7	045237	14.7N 152.4E	PCN 5	T2.0/2.0 /01.0/24HRC	DMSP1A		PGTW
8	045018	14.7N 152.4E	PCN 4		DMSP14		PGTW
9	044936	14.7N 152.4E	PCN 6		DMSP17		PGTW
10	044116	14.6N 152.4E	PCN 6		DMSP14		PGTW
11	044112	14.6N 152.4E	PCN 6	T2.5/2.5 /00.5/25HRC	DMSP14	LOW CONFIDENCE	PGTW
12	042212	14.6N 152.7E	PCN 6		DMSP1A		PGTW
13	070416	14.7N 152.1E	PCN 6		DMSP17		PGTW
14	071101	14.7N 152.4E	PCN 5		DMSP1A		PGTW
15	072338	14.7N 152.4E	PCN 5	T3.0/3.0 /01.0/24HRC	DMSP14		PGTW
16	072343	14.7N 152.1E	PCN 5		DMSP1A		PGTW
17	040755	14.7N 152.2E	PCN 6		DMSP17		PGTW
18	040843	14.7N 152.0E	PCN 4		DMSP1A		PGTW
19	042037	14.7N 152.4E	PCN 5		DMSP17		PGTW
20	042325	14.7N 152.7E	PCN 5	T3.5/3.5 /00.5/24HRC	DMSP1A		PGTW
21	040101	14.7N 152.1E	PCN 5		DMSP14		PGTW
22	042016	14.7N 152.7E	PCN 4		DMSP17		PGTW
23	100042	14.7N 152.7E	PCN 5	T5.0/5.0	DMSP14	INIT JDS	RODN
24	100042	14.7N 152.4E	PCN 5	T4.5/4.5	DMSP14	INIT JDS	RPWK
25	100042	14.7N 152.4E	PCN 5	T4.5/4.5 /01.0/25HRC	DMSP14		PGTW
26	100957	14.7N 152.4E	PCN 6		DMSP17		PGTW
27	100957	14.7N 152.0E	PCN 6		DMSP17		RODN
28	101149	14.7N 152.1E	PCN 2		DMSP1A		PGTW
29	101149	14.7N 152.1E	PCN 2		DMSP1A		RPWK
30	101149	14.7N 152.0E	PCN 2		DMSP1A		RODN
31	110031	14.7N 152.7E	PCN 1	T6.0/6.0 /01.5/24HRC	DMSP1A		RPWK
32	111012	14.7N 152.4E	PCN 1		DMSP1A		PGTW
33	111014	14.7N 152.3E	PCN 1		DMSP17		RODN
34	111131	14.7N 152.1E	PCN 4		DMSP1A		PGTW
35	111304	14.7N 152.2E	PCN 1		DMSP14		RPWK
36	112117	14.7N 152.6E	PCN 1	T7.5/7.5	DMSP17	INIT JDS	RODN
37	112117	14.7N 152.4E	PCN 1	T7.0/7.0	DMSP17	INIT JDS	PGTW
38	120012	14.7N 152.2E	PCN 1		DMSP1A		PGTW
39	120144	14.7N 152.3E	PCN 1	T7.0/7.0 /01.0/25HRC	DMSP14		RPWK
40	120145	14.7N 152.0E	PCN 1		DMSP14		PGTW
41	120957	14.7N 152.3E	PCN 1		DMSP17		PGTW
42	121254	14.7N 152.7E	PCN 1		DMSP1A		PGTW
43	121254	14.7N 152.2E	PCN 1		DMSP1A		RODN
44	122057	14.7N 152.3E	PCN 1		DMSP17		PGTW
45	122354	14.7N 152.1E	PCN 1	T8.5/7.0 /00.5/27HRC	DMSP1A		PGTW
46	130126	14.7N 152.0E	PCN 1		DMSP14		PGTW
47	130126	14.7N 152.1E	PCN 1	T7.0/7.5 /00.5/24HRC	DMSP14		RODN
48	130337	14.7N 152.4E	PCN 1		DMSP17		PGTW
49	131220	14.7N 152.4E	PCN 1		DMSP14		RODN
50	131236	14.7N 152.4E	PCN 3		DMSP1A		PGTW
51	132036	14.7N 152.6E	PCN 5		DMSP17		PGTW
52	132336	14.7N 152.4E	PCN 1	T3.0/3.0 /01.5/24HRC	DMSP1A		PGTW
53	140106	14.7N 152.7E	PCN 1		DMSP14		PGTW
54	140107	14.7N 152.4E	PCN 1	T6.0/7.0 /01.0/24HRC	DMSP14		RODN
55	140317	14.7N 152.5E	PCN 1		DMSP17		PGTW
56	141206	14.7N 152.2E	PCN 1		DMSP14		PGTW
57	141206	14.7N 152.2E	PCN 1		DMSP14		RODN
58	141348	14.7N 152.1E	PCN 1		DMSP14		PGTW
59	142157	14.7N 152.2E	PCN 1	T3.0/5.0 /50.0/27HRC	DMSP17		PGTW
60	140047	14.7N 152.6E	PCN 1		DMSP14		PGTW
61	140048	14.7N 152.7E	PCN 1	T5.5/6.0 /00.5/24HRC	DMSP14		RODN
62	140059	14.7N 152.7E	PCN 2		DMSP1A		PGTW
63	140229	14.7N 152.6E	PCN 1		DMSP14		RODN
64	141038	14.7N 152.5E	PCN 5		DMSP17		PGTW
65	141200	14.7N 152.3E	PCN 5		DMSP1A		PGTW
66	141329	14.7N 152.2E	PCN 5		DMSP14		PGTW
67	141329	14.7N 152.2E	PCN 5		DMSP14		RODN
68	142137	14.7N 152.2E	PCN 1	T5.0/5.0 /50.0/24HRC	DMSP17		PGTW
69	140041	14.7N 152.1E	PCN 3		DMSP1A		PGTW
70	140204	14.7N 152.2E	PCN 3		DMSP14		PGTW
71	140210	14.7N 152.1E	PCN 3	T3.0/5.5 /00.5/25HRC	DMSP14		RODN
72	141018	14.7N 152.7E	PCN 3		DMSP17		PGTW
73	141324	14.7N 152.6E	PCN 3		DMSP1A		PGTW
74	142117	14.7N 152.2E	PCN 3		DMSP17		PGTW
75	170024	21.2N 128.1E	PCN 3	T5.0/5.0-50.0/27HRC	DMSP1A		PGTW
76	170151	21.4N 128.0E	PCN 3		DMSP14		PGTW
77	170151	21.4N 128.0E	PCN 5	T5.0/5.0	DMSP14	INIT JDS	RPWK
78	170151	21.4N 127.4E	PCN 1	T5.0/5.0 /50.0/24HRC	DMSP14		RODN
79	170957	22.7N 127.4E	PCN 3		DMSP17		PGTW
80	171251	21.8N 127.4E	PCN 3		DMSP14		RODN
81	171306	22.3N 127.4E	PCN 3		DMSP17		PGTW
82	172056	24.1N 128.0E	PCN 3		DMSP17		PGTW
83	172057	24.4N 127.7E	PCN 6		DMSP17		RODN
84	180006	25.7N 128.3E	PCN 3	T4.5/5.0 /00.5/24HRC	DMSP1A		PGTW
85	180131	25.2N 128.2E	PCN 3	T4.5/5.0 /00.5/24HRC	DMSP14		RPWK
86	180132	25.2N 128.0E	PCN 3		DMSP14		PGTW
87	180132	24.4N 128.0E	PCN 3	T3.5/4.5 /01.5/24HRC	DMSP14		RODN
88	180937	27.2N 128.4E	PCN 3		DMSP17		PGTW
89	180937	27.5N 128.4E	PCN 4		DMSP17		RODN
90	181118	28.2N 128.6E	PCN 3		DMSP17		RODN

91	121231	24.6N	130.5E	PCN 5	DMSD39		RPMK
92	121248	24.7N	130.5E	PCN 3	DMSD34		PGTW
93	120306	30.6N	131.0E	PCN 3	DMSD17		PGTW
94	120348	32.7N	134.0E	PCN 3	DMSD14		PGTW
95	120112	33.6N	134.6E	PCN 5	DMSD39	INIT JDS	RKSO
96	120112	33.7N	135.2E	PCN 3	DMSD39	PSBL LLCP	RODQ
97	121212	41.1N	145.0E	PCN 5	DMSD39		RKSO
98	121212	41.1N	144.5E	PCN 5	DMSD39		RKSO
99	120216	43.7N	144.4E	PCN 5	DMSD17	EXPSU GLFC	RKSO

#### ATCRAFT FIXES

FIX NO.	TIME (Z)	FIX POSITION	FLT LVL	70043 HGT	OBS MSLP	MAX-SFC-WIND VEL/ARG/RNG	MAX-FLT-LVL-WIND VEL/ARG/RNG	ACFT NAV/MET	EYE SHAPE	EYE ORIENT DIAW/TATION	HYF TEMP (C) DUT/ IN/ DP/SET	ASN NO.
1	040514	4.2N 153.0E	1500FT		1004	25 276 10	270 29 180 30	4 5				1
2	050030	5.4N 154.6E	700MM	1095	1004	25 270 18	140 33 360 120	5 10				2
3	050510	5.9N 155.3E	1500FT		1003	25 050 30	170 27 360 15	2 5				3
4	050800	5.7N 155.1E	700MM	1113	1003	35 230 40	270 37 210 60	2 4				4
5	061943	7.1N 153.4E	700MM	1112		40 110 12	060 34 300 20	4 4				5
6	062222	7.2N 153.4E	700MM	1124		35 010 30	100 26 010 60	4 2				6
7	060713	7.4N 153.0E	700MM	1110	1000	10 040 20	040 31 270 60	4 5				7
8	062111	7.3N 152.5E	700MM	1100	998	40 360 15	080 30 290 90	2 2				8
9	070305	7.4N 152.3E	700MM	1101		35 320 30	100 33 320 30	4 4				9
10	070617	6.9N 152.4E	700MM	1095		30 110 50	100 32 310 60	4 10				10
11	070801	6.4N 152.0E	700MM	1106		30 100 55	070 56 010 15	4 4				11
12	071428	6.3N 151.7E	700MM	1091	1005		070 51 310 65	5 5				12
13	071956	6.6N 152.2E	700MM	1072			140 45 060 30	10 5				13
14	072030	6.9N 152.2E	700MM	1054	997	40 180 35	270 40 180 30	5 5				14
15	080248	6.2N 151.5E	700MM	1047	995	35 230 105	220 44 130 120	5 5				15
16	080550	9.0N 151.3E	700MM	1034		35 050 30	140 35 050 30	4 4				16
17	080825	9.3N 150.9E	700MM	1043	995		090 38 350 30	8 10				17
18	121557	10.3N 150.1E	700MM	1027	991		110 50 360 100	5 10				18
19	081900	10.4N 148.0E	700MM				070 37 340 75	5 10				19
20	082140	11.3N 148.5E	700MM	9994	989	50 320 20	140 50 120 60	5 10	CIRCULAR	25		20
21	090005	12.1N 147.7E	700MM	9996		50 150 10	070 48 310 80	3 2				21
22	090241	12.6N 146.8E	700MM	9960	985	50 130 10	100 43 130 115	2 3	CIRCULAR	25		22
23	090521	12.7N 145.6E	700MM	9936		60 160 45	080 69 360 50	5 2				23
24	090735	12.7N 145.2E	700MM	9931	981	55 080 68	100 57 020 72	2 2				24
25	091201	12.9N 144.3E	700MM	9889	974		290 43 210 10	2 2				25
26	092006	12.9N 143.2E	700MM	2773		70 070 10	140 57 070 10	1 5	CIRCULAR	8		26
27	092110	12.9N 142.9E	700MM	2712	959	90 360 10	130 78 360 15	1 10	CIRCULAR	20		27
28	100951	13.7N 141.3E	700MM	2654	949		106 10 10	3 3	CIRCULAR	15		28
29	102340	14.2N 130.5E	700MM	2237	900	130 050 10	140 125 050 10	2 2	CIRCULAR	15		29
30	111308	15.3N 130.4E	700MM	2271			240 120 160 14	4 5	CUNCENTRIC			30
31	111529	15.6N 130.1E	700MM	2201	900		180 125 130 70	4 5	CUNCENTRIC	20	130	31
32	120353	16.7N 137.0E	700MM	1944	870	130 090 50	200 110 090 15	4 4	CIRCULAR	12		32
33	120655	16.3N 137.5E	700MM	1995		130 310 07	010 110 310 10	4 4	CIRCULAR			33
34	120837	16.9N 137.3E	700MM	2058	884	130 130 6	210 110 130 15	4 4	CIRCULAR	12		34
35	121901	16.9N 136.8E	700MM	2201			340 125 270 35	4 2	CIRCULAR	10		35
36	122122	16.7N 136.5E	700MM	2224	903	130 360 25	040 114 360 18	4 2	CIRCULAR	12		36
37	130503	16.7N 135.4E	700MM	2244		30 140 55	210 105 130 30	5 2	CIRCULAR			37
38	130810	16.7N 135.6E	700MM	2267	905		070 100 310 30	2 2	ELLIPTICAL	40 25 100		38
39	140809	17.0N 134.0E	700MM	2417	922	50 230 135	080 86 360 90	2 5	ELLIPTICAL	10 7 150		39
40	140510	17.2N 133.4E	700MM	2391		130 100 7	190 110 100 10	4 2				40
41	140900	17.2N 132.4E	700MM	2383	919		090 95 040 50	5 2	CIRCULAR	14		41
42	140600	18.4N 130.4E	700MM	2381		50 240 130	230 82 140 90	2 3	CIRCULAR			42
43	140824	18.5N 130.1E	700MM	2387	919	95 030 15	140 98 050 60	2 5	CIRCULAR	13		43
44	141900	19.0N 129.4E	700MM	2433			220 101 140 95	4 3				44
45	142135	19.3N 129.4E	700MM	2435	924		110 87 360 20	5 4				45
46	140808	20.2N 128.9E	700MM	2490	931	80 240 14	320 74 240 50	5 5	CIRCULAR	25		46
47	141203	20.6N 128.6E	700MM	2520			67 18 90	5 5				47
48	141407	20.7N 128.6E	700MM	2513	931		220 76 150 50	5 5	CIRCULAR	25		48
49	141904	21.0N 128.3E	700MM	2521			230 85 130 50	5 4				49
50	142150	21.2N 128.3E	700MM	2356	935		140 80 040 150	5 5				50
51	170735	22.5N 128.0E	700MM	2567			100 87 120 12	4 3				51
52	170908	22.7N 127.8E	700MM	2562	939	70 160 30	170 77 020 60	4 3				52
53	170908	22.7N 127.8E	700MM	2562			110 80 360 90	4 3				53
54	151407	23.6N 127.3E	700MM	2582			100 99 200 30	4 3	CIRCULAR	35		54
55	171901	24.2N 127.7E	700MM	2579			290 72 210 12	5 3				55
56	172114	24.6N 127.7E	700MM	2590			210 95 140 100	4 4				56
57	181132	24.3N 130.0E	700MM	2694			190 89 090 120	4 3				57
58	181401	24.0N 130.7E	700MM	2719			140 60 010 120	4 4				58
59	182221	29.2N 133.4E	700MM	2831	971	90 120 10	230 85 110 110	2 2				59

#### RAJAP FIXES

FIX NO.	TIME (Z)	FIX POSITION	HADAR	ACFT	EYE SHAPE	EYE DIAW	RADAR-CODE ASMAN DUFT	COMMENTS.	HADAR POSITION	STF WND NO.
1	090335	12.4N 144.5E	LAND	FAIR					13.0N 144.9E	01218
2	090410	12.4N 144.3E	LAND	FAIR					13.0N 144.9E	01218
3	090435	12.4N 144.1E	LAND	FAIR					13.0N 144.9E	01218
4	090500	12.4N 143.8E	LAND	FAIR	CIRCULAR	20			13.0N 144.9E	01218
5	090510	12.4N 144.0E	LAND	FAIR	CIRCULAR	20			13.0N 144.9E	01218
6	090510	12.4N 144.0E	LAND	FAIR	CIRCULAR	20			13.0N 144.9E	01218
7	090535	12.4N 144.0E	LAND	FAIR	CIRCULAR	15			13.0N 144.9E	01218
8	090710	12.4N 144.5E	LAND	FAIR	CIRCULAR	15			13.0N 144.9E	01218
9	090735	12.4N 144.4E	LAND	FAIR	CIRCULAR	15			13.0N 144.9E	01218
10	090810	12.7N 144.2E	LAND	FAIR	CIRCULAR	20			13.0N 144.9E	01218
11	090935	12.4N 144.1E	LAND	FAIR	CIRCULAR	20			13.0N 144.9E	01218
12	090910	12.4N 144.0E	LAND	FAIR	CIRCULAR	20			13.0N 144.9E	01218
13	090935	12.4N 144.0E	LAND	FAIR	CIRCULAR	20			13.0N 144.9E	01218
14	091010	12.7N 144.8E	LAND	FAIR	CIRCULAR	15			13.0N 144.9E	01218
15	091035	12.7N 144.7E	LAND	FAIR	CIRCULAR	15			13.0N 144.9E	01218

16	001110	12.70	144.7E	LAND	GRUU	CIRCHLAR	15			13.0N	144.9E	01218
17	001130	12.80	144.5E	LAND	GRUU	CIRCHLAR	15			13.0N	144.9E	01218
18	001210	12.80	144.5E	LAND	GRUU	CIRCHLAR	15			13.0N	144.9E	01218
19	001230	12.80	144.4E	LAND	GRUU	CIRCHLAR	15			13.0N	144.9E	01218
20	001310	12.80	144.3E	LAND	FAIR	CIRCHLAR	15			13.0N	144.9E	01218
21	001330	12.80	144.2E	LAND	GRUU	CIRCHLAR	15			13.0N	144.9E	01218
22	001410	12.80	144.1E	LAND	GRUU	CIRCHLAR	15			13.0N	144.9E	01218
23	001430	12.80	144.1E	LAND	GRUU	CIRCHLAR	15			13.0N	144.9E	01218
24	001510	12.80	144.1E	LAND	GRUU	CIRCHLAR	15			13.0N	144.9E	01218
25	001530	12.70	144.1E	LAND	GRUU	CIRCHLAR	15			13.0N	144.9E	01218
26	001600	12.70	144.1E	LAND	GRUU	CIRCHLAR	10			13.0N	144.9E	01218
27	001630	12.60	144.1E	LAND	GRUU	CIRCHLAR	10			13.0N	144.9E	01218
28	001710	12.70	144.1E	LAND	GRUU	CIRCHLAR	10			13.0N	144.9E	01218
29	001730	12.80	144.1E	LAND	GRUU	CIRCHLAR	10			13.0N	144.9E	01218
30	001810	12.80	144.1E	LAND	GRUU	CIRCHLAR	10			13.0N	144.9E	01218
31	001830	12.80	144.1E	LAND	GRUU	CIRCHLAR	7			13.0N	144.9E	01218
32	001910	12.80	144.1E	LAND	GRUU	CIRCHLAR	10			13.0N	144.9E	01218
33	001930	12.80	144.1E	LAND	GRUU	CIRCHLAR	10			13.0N	144.9E	01218
34	002010	12.80	144.1E	LAND	FAIR	CIRCHLAR	10			13.0N	144.9E	01218
35	171230	23.20	127.7E	LAND	GRUU		45			24.0N	125.3E	07997
36	171400	23.30	127.7E	LAND	GRUU		45			24.0N	125.3E	07997
37	171500	23.50	127.7E	LAND	GRUU		45			24.0N	125.3E	07997
38	171500	23.70	127.0E	LAND	GRUU		45			24.0N	125.3E	07997
39	171700	23.30	127.7E	LAND	GRUU		45			24.0N	125.3E	07997
40	171708	24.00	127.5E	LAND				3///3 53/10		26.2N	127.0E	07997
41	171900	24.00	127.7E	LAND	PHOR					24.0N	125.3E	07997
42	171900	24.10	127.5E	LAND	PHOR					26.3N	126.0E	07999
43	171900	24.30	127.7E	LAND				6///2 70311		26.2N	127.0E	07997
44	172000	24.20	127.7E	LAND	PHOR					26.3N	126.0E	07999
45	172000	24.40	127.7E	LAND				6///3 70211		26.2N	127.0E	07997
46	172035	24.80	127.5E	LAND	FAIR					26.4N	127.0E	07997
47	172100	24.30	127.5E	LAND	PHOR					26.3N	126.0E	07999
48	172100	24.40	127.7E	LAND				6///3 70110		26.2N	127.0E	07997
49	172200	24.50	127.4E	LAND	GRUU					26.3N	126.0E	07999
50	172200	24.70	127.7E	LAND				6///3 73608		26.2N	127.0E	07997
51	172235	25.00	127.5E	LAND	PHOR					26.4N	127.0E	07997
52	172300	24.30	127.7E	LAND				6///1 70209		26.2N	127.0E	07997
53	172310	24.80	127.7E	LAND	PHOR					26.4N	127.0E	07997
54	172320	24.80	127.7E	LAND	PHOR					24.0N	125.3E	07997
55	172335	24.90	127.7E	LAND	PHOR					26.4N	127.0E	07997
56	180000	25.00	129.0E	LAND	GRUU		40			26.3N	126.0E	07999
57	180000	25.10	127.7E	LAND				3///19 70111		26.2N	127.0E	07997
58	180010	25.10	127.8E	LAND	PHOR					26.4N	127.0E	07997
59	180035	25.20	127.8E	LAND	PHOR					26.4N	127.0E	07997
60	180100	25.30	129.0E	LAND				3///12 70308		26.2N	127.0E	07997
61	180120	25.30	129.1E	LAND	GRUU		40			26.3N	126.0E	07999
62	180135	25.50	127.9E	LAND	PHOR					26.4N	127.0E	07997
63	180200	24.50	129.0E	LAND				3///12 70111		26.2N	127.0E	07997
64	180210	25.50	129.1E	LAND	GRUU		45			26.3N	126.0E	07999
65	180210	25.80	129.0E	LAND	PHOR					26.4N	127.0E	07997
66	180235	25.70	129.1E	LAND	PHOR					26.4N	127.0E	07997
67	180300	25.70	129.5E	LAND				3///12 70514		26.2N	127.0E	07997
68	180300	25.70	129.3E	LAND	GRUU		45			26.3N	126.0E	07999
69	180310	25.90	127.3E	LAND	PHOR					26.4N	127.0E	07997
70	180335	26.10	129.5E	LAND	PHOR					26.4N	127.0E	07997
71	180400	26.10	129.8E	LAND				6///2 70218		26.2N	127.0E	07997
72	180400	26.90	129.1E	LAND				6///1 51111		26.2N	127.0E	07997
73	180400	26.90	129.4E	LAND	GRUU		45			26.4N	127.0E	07997
74	180410	26.20	129.4E	LAND	PHOR					26.3N	126.0E	07999
75	180435	26.40	129.7E	LAND	PHOR					26.4N	127.0E	07997
76	180445	26.40	129.4E	LAND	GRUU					26.4N	127.0E	07997
77	180445	26.40	129.4E	LAND	GRUU					26.2N	127.7E	07997
78	180500	26.40	129.4E	LAND				6///1 50327		26.4N	129.5E	07999
79	180500	26.50	129.5E	LAND				6///4 70222		26.2N	127.0E	07997
80	180500	26.30	129.5E	LAND	GRUU		40			26.3N	126.0E	07999
81	180510	26.70	129.8E	LAND	PHOR					26.4N	127.0E	07997
82	180535	26.80	129.7E	LAND	PHOR					26.4N	127.0E	07997
83	180545	26.60	129.6E	LAND	PHOR					26.2N	127.7E	07997
84	180545	26.50	129.6E	LAND	PHOR					26.2N	127.7E	07997
85	180500	26.60	129.7E	LAND	FAIR		45			26.3N	126.0E	07999
86	180500	26.60	129.7E	LAND				6///4 70219		26.2N	127.0E	07997
87	180500	26.40	129.5E	LAND				6///1 50509		26.4N	129.5E	07999
88	180510	26.30	129.7E	LAND	PHOR					26.4N	127.0E	07997
89	180700	27.00	129.0E	LAND				6///2 70320		26.2N	127.0E	07997
90	180700	26.90	129.7E	LAND	PHOR					26.3N	126.0E	07999
91	180700	26.80	129.9E	LAND				6///1 50430		26.4N	129.5E	07999
92	180800	27.10	129.9E	LAND	PHOR					26.3N	126.0E	07999
93	180800	27.10	129.2E	LAND				6///3 70618		26.2N	127.0E	07997
94	180800	27.20	129.0E	LAND				6///1 50327		26.4N	129.5E	07999
95	180900	27.50	129.3E	LAND	PHOR					27.4N	129.7E	07997
96	180900	27.20	129.5E	LAND				///13 70516		26.2N	127.0E	07997
97	180900	27.50	129.3E	LAND				6///1 50519		26.4N	129.5E	07999
98	181000	27.70	129.5E	LAND				6///1 50316		26.4N	129.5E	07999
99	181000	27.70	129.4E	LAND	PHOR					27.4N	129.7E	07997
100	181100	27.80	129.8E	LAND	PHOR					27.4N	129.7E	07997
101	181100	27.80	129.7E	LAND				6///1 50324		26.4N	129.5E	07999
102	181200	27.30	129.8E	LAND				6///1 50316		26.4N	129.5E	07999
103	181300	27.50	130.0E	LAND				6///1 50423		26.4N	129.5E	07999
104	181400	27.80	130.4E	LAND				6///1 50527		26.4N	129.5E	07999
105	181500	27.20	130.8E	LAND				6///2 51111		30.6N	131.0E	07849
106	181500	27.10	130.9E	LAND				6///1 50629		26.4N	129.5E	07999
107	181600	27.40	131.3E	LAND				6///1 50627		30.6N	131.0E	07849
108	181700	27.60	131.6E	LAND				6///1 50522		30.6N	131.0E	07849
109	182330	32.20	134.2E	LAND	PHOR							

KUSHIMOTO

SUPER TYPHOON VERA

SATELLITE FIXES

FIX NO.	TIME (Z)	FIX POSITION	ACRY	UVCRAK CODE	SATELLITE	COMMENTS	SITE
1	312316	6.2N 149.0E	PCN 5	T1.0/1.0	DWSP3A	INIT JDS	PGTW
2	010026	6.2N 149.9E	PCN 5		DWSP3A		PGTW
3	010814	6.2N 149.3E	PCN 5		DWSP3A	CI UP	PGTW
4	011126	6.3N 147.0E	PCN 5		DWSP3A		PGTW
5	011158	6.3N 147.2E	PCN 5		DWSP3A		PGTW
6	012055	6.9N 146.7E	PCN 5		DWSP3A		PGTW
7	012250	6.9N 146.0E	PCN 5		DWSP3A		PGTW
8	020007	6.6N 145.7E	PCN 5	T2.0/2.0 /D1.0/24HRS	DWSP3A		PGTW
9	020335	7.2N 143.9E	PCN 5		DWSP3A		PGTW
10	021140	7.2N 143.6E	PCN 5		DWSP3A		PGTW
11	021248	7.1N 143.4E	PCN 5		DWSP3A		PGTW
12	021248	6.9N 143.2E	PCN 5		DWSP3A		PGTW
13	022034	7.5N 141.5E	PCN 5		DWSP3A		PGTW
14	030021	8.3N 141.0E	PCN 5	T3.5/3.5	DWSP3A	INIT JDS	PGTW
15	030021	7.9N 141.1E	PCN 5	T3.0/3.0 /D1.0/24HRS	DWSP3A		PGTW
16	030129	8.2N 140.7E	PCN 5		DWSP3A		PGTW
17	030314	9.0N 137.8E	PCN 6		DWSP3A		PGTW
18	031228	9.2N 137.1E	PCN 6		DWSP3A		PGTW
19	031229	9.4N 137.2E	PCN 5		DWSP3A		PGTW
20	031302	9.2N 136.9E	PCN 6		DWSP3A		PGTW
21	032155	10.5N 137.8E	PCN 1		DWSP3A		PGTW
22	040003	10.5N 137.0E	PCN 1	T5.0/5.0+/D2.0/24HRS	DWSP3A		PGTW
23	040110	10.5N 137.7E	PCN 1		DWSP3A		PGTW
24	040110	10.5N 137.6E	PCN 1	T5.0/5.0	DWSP3A	INIT JDS	PGTW
25	041035	11.4N 129.7E	PCN 2		DWSP3A		PGTW
26	041244	11.9N 129.0E	PCN 1		DWSP3A		PGTW
27	041245	11.7N 128.8E	PCN 2		DWSP3A		PGTW
28	041351	11.4N 128.7E	PCN 2		DWSP3A		PGTW
29	042135	12.4N 126.6E	PCN 1	T5.5/6.5 /D0.5/24HRS	DWSP3A		PGTW
30	042135	12.5N 126.5E	PCN 1		DWSP3A		PGTW
31	050126	12.9N 126.9E	PCN 1	T6.0/6.0+/D1.0/24HRS	DWSP3A		PGTW
32	050232	13.1N 126.9E	PCN 1	T6.5/6.5	DWSP3A	INIT JDS	PGTW
33	050232	13.1N 126.8E	PCN 1		DWSP3A		PGTW
34	051015	14.1N 124.4E	PCN 2		DWSP3A		PGTW
35	05 226	14.4N 123.9E	PCN 1		DWSP3A		PGTW
36	051332	14.4N 123.6E	PCN 1		DWSP3A		PGTW
37	051332	14.5N 123.7E	PCN 1		DWSP3A		PGTW
38	051608	14.4N 124.1E	PCN 1		DWSP3A		PGTW
39	052256	14.4N 122.9E	PCN 3		DWSP3A		PGTW
40	060108	15.4N 123.1E	PCN 3	T4.5/5.5 /W1.0/24HRS	DWSP3A		PGTW
41	060109	15.4N 122.9E	PCN 3	T5.5/6.5-/W1.0/24HRS	DWSP3A		PGTW
42	060213	15.7N 122.3E	PCN 1		DWSP3A		PGTW
43	060213	15.9N 122.5E	PCN 1	T6.0/6.0+/S0.0/24HRS	DWSP3A		PGTW
44	060954	16.7N 122.2E	PCN 3		DWSP3A		PGTW
45	061312	17.1N 122.2E	PCN 5		DWSP3A		PGTW
46	061350	17.2N 122.3E	PCN 5		DWSP3A		PGTW
47	061351	17.2N 122.3E	PCN 3		DWSP3A		PGTW
48	062236	18.3N 121.5E	PCN 3		DWSP3A		PGTW
49	070050	18.5N 121.7E	PCN 5		DWSP3A		PGTW
50	070153	17.9N 121.7E	PCN 5	T4.0/5.0 /W2.0/24HRS	DWSP3A		PGTW
51	070154	18.6N 121.7E	PCN 5	T3.0/4.0 /W1.5/24HRS	DWSP3A		PGTW
52	071116	18.7N 122.1E	PCN 1		DWSP3A		PGTW
53	071332	16.4N 117.9E	PCN 5		DWSP3A		PGTW
54	080032	16.1N 114.5E	PCN 5		DWSP3A	APRINT 6LCC	PGTW

AIRCRAFT FIXES

FIX NO.	TIME (Z)	FIX POSITION	FLT LVL	70043 HGT	OBS MSLP	MAX-CFC-WND VEL/ARQ/RNG	MAX-FLT-LVL-WND HTH/VEL/BNG/HNR	ACRY NAV/MET	EYE SHAPE	EYE ORIEN- DIRECTION	BYE TEMP (C) DIR/ 1N/ DP/SGT	WGN NO.
1	020625	7.4N 144.5E	1500FT		994	50 130	7 140 65 060 20	5 2			+21 +24 +22	2
2	030500	8.4N 139.3E	700MM	2471		70 090	5 140 46 240 30	5 2			+14 +10	4
3	030753	8.9N 134.4E	700MM	2946	982		140 73 020 8	5 2	CIRCULAR	17	+11 +15 + 8	4
4	031833	10.1N 134.7E	700MM	2720			120 120 080 17	5 5	CIRCULAR	20	+14 +11	5
5	032049	10.2N 134.3E	700MM	2643	945	130 270	3 120 125 270 10	5 1	CIRCULAR	8	+10 +19 + 8	5
6	040507	11.0N 131.5E	700MM	2390		130 110	5 140 170 110 5	5 1	CIRCULAR	8	+12 +23 +13	6
7	041900	12.2N 127.4E	700MM	2349	915		120 100 060 10	4 2	CIRCULAR		+19 +14	7
8	042125	12.5N 126.5E	700MM	2372	919	120 330	3 240 111 180 14	4 2	CUNCENTRIC	25	+14 +15 +14	7
9	050418	13.2N 124.1E	700MM	2413		130 050	7 120 116 050 12	4 5			+15 +12	8
10	050702	13.6N 124.8E	700MM	2410		130 140	4 140 100 270 10	4 2	CIRCULAR	7	+10 +15 +15	9
11	052017	14.1N 123.3E	700MM	2357			100 103 110 30	4 2	CIRCULAR	10	+15 +15	9
12	052232	14.1N 122.7E	700MM	2587				5 1	CIRCULAR	30	+15 +15 +15	9
13	060520	16.9N 122.3E	700MM	2647	941	65 060	40 140 85 070 25	5 1	CIRCULAR			10
14	062001	17.4N 121.0E	700MM			100 050	35 120 52 020 60	5			+15 + 4	11

# RAJAM FIXES

FIX NO.	TIME (Z)	FIX POSITION	HADAR	ACONY	EYE SHAPE	EYE DIAM	MAIN- CODE ACYON	COMMENTS	HADAR POSITION	CTF NO.
1	040716	11.2N 120.7E	ACFT							
2	040800	11.2N 120.6E	LAND				20011 11111		10.3N 120.0E	08046
3	040805	11.2N 120.5E	LAND				11205 30111		10.1N 123.0E	08040
4	040800	11.2N 120.3E	LAND				10111 53400		10.1N 123.0E	08040
5	040800	11.2N 120.0E	LAND				20001 11111		10.0N 120.3E	08047
6	040800	11.2N 120.7E	LAND				10043 53515		10.1N 123.0E	08040
7	040830	11.2N 120.7E	LAND				20011 53020		10.0N 120.3E	08047
8	040700	11.2N 120.5E	LAND				20011 53315		10.3N 120.0E	08046
9	040700	11.2N 120.1E	LAND				20011 53300		10.1N 123.0E	08040
10	040800	11.2N 120.4E	LAND				20043 53325		10.0N 120.3E	08047
11	040800	11.2N 120.6E	LAND				20011 53125		10.0N 120.3E	08047
12	040800	11.2N 120.6E	LAND				20011 52921		10.1N 123.0E	08040
13	040800	11.2N 120.6E	LAND				20011 52921		10.0N 120.3E	08047
14	040800	11.2N 120.6E	LAND				20011 53314		10.0N 120.3E	08047
15	041000	11.2N 120.5E	LAND				20011 11111		10.1N 123.0E	08040
16	041100	11.2N 120.5E	LAND				20011 54716		10.1N 123.0E	08040
17	041300	11.2N 120.5E	LAND				20011 53212		10.1N 123.0E	08040
18	041400	11.2N 120.5E	LAND				10043 53416		10.1N 123.0E	08040
19	041500	11.2N 120.5E	LAND				10043 53416		10.1N 123.0E	08040
20	041600	11.2N 120.5E	LAND						15.2N 120.6E	08377
21	041800	11.2N 120.5E	LAND						15.2N 120.6E	08377
22	041900	11.2N 120.5E	LAND						15.2N 120.6E	08377
23	041945	11.2N 120.5E	LAND						15.2N 120.6E	08377
24	042005	11.2N 120.5E	LAND						15.2N 120.6E	08377
25	042035	11.2N 120.5E	LAND						15.2N 120.6E	08377
26	042110	11.2N 120.5E	LAND						15.2N 120.6E	08377
27	042135	11.2N 120.5E	LAND						15.2N 120.6E	08377
28	042215	11.2N 120.5E	LAND						15.2N 120.6E	08377
29	042235	11.2N 120.5E	LAND						15.2N 120.6E	08377
30	042300	11.2N 120.5E	LAND				11111 11111		10.3N 120.6E	08371
31	042300	11.2N 120.5E	LAND				10043 53500		10.1N 123.0E	08040
32	042300	11.2N 120.5E	LAND						15.2N 120.6E	08377
33	040000	11.2N 120.5E	LAND				10021 51111		10.3N 120.6E	08371
34	040100	11.2N 120.5E	LAND				10043 53204		10.1N 123.0E	08040
35	040100	11.2N 120.5E	LAND				20011 51111		10.3N 120.6E	08371
36	040200	11.2N 120.5E	LAND				10043 53520		10.1N 123.0E	08040
37	040200	11.2N 120.5E	LAND				10011 51111		10.3N 120.6E	08371
38	040300	11.2N 120.5E	LAND				10043 53410		10.1N 123.0E	08040
39	040300	11.2N 120.5E	LAND				10011 51111		10.3N 120.6E	08371
40	040400	11.2N 120.5E	LAND				10043 53411		10.3N 120.6E	08371
41	040400	11.2N 120.5E	LAND				10043 53411		10.1N 123.0E	08040
42	040430	11.2N 120.5E	LAND				10011 53006		10.3N 120.6E	08371
43	040500	11.2N 120.5E	LAND				10043 53400		10.1N 123.0E	08040
44	040500	11.2N 120.5E	LAND				10043 53513		10.3N 120.6E	08371
45	040500	11.2N 120.5E	LAND				10011 53210		10.1N 123.0E	08040
46	040700	11.2N 120.5E	LAND				20043 52111		10.3N 120.6E	08371
47	040930	11.2N 120.5E	LAND				10000 52705		10.3N 120.6E	08371
48	041200	11.2N 120.5E	LAND				45111 72011		10.3N 120.6E	08371
49	041500	11.2N 120.5E	LAND				45111 72011		10.3N 120.6E	08371
50	041500	11.2N 120.5E	LAND				45111 72011		10.3N 120.6E	08371
51	041900	11.2N 120.5E	LAND				10011 53400		10.3N 120.6E	08371
52	041900	11.2N 120.5E	LAND				20011 52713		10.3N 120.6E	08371
53	070100	11.2N 120.5E	LAND				20011 52015		10.3N 120.6E	08371
54	070200	11.2N 120.5E	LAND				20011 52015		10.3N 120.6E	08371
55	070300	11.2N 120.5E	LAND				45111 72011		10.3N 120.6E	08371
56	070300	11.2N 120.5E	LAND				45111 72011		10.3N 120.6E	08371
57	070500	11.2N 120.5E	LAND				45111 72011		10.3N 120.6E	08371
58	070500	11.2N 120.5E	LAND				45111 72011		10.3N 120.6E	08371
59	070700	11.2N 120.5E	LAND				45111 72011		10.3N 120.6E	08371
60	070900	11.2N 120.5E	LAND				45111 72011		10.3N 120.6E	08371

## SYNOPTIC FIXES

FIX NO.	TIME (Z)	FIX POSITION	INTENSITY ESTIMATE	NEAREST DATA (NM)	COMMENTS
1	200000	10.0N 150.5E	05	60	
2	201200	10.0N 150.5E	05	120	
3	300000	10.0N 150.5E	10	225	
4	301200	10.0N 150.5E	05	320	
5	310000	10.0N 151.0E	10	90	
6	311200	10.0N 150.5E	15	75	
7	071200	10.0N 150.5E	20	30	
8	080000	10.0N 150.5E	20	90	
9	081200	10.0N 150.5E	15	120	

TROPICAL STORM WAYNE  
SATELLITE FIXES

FIX NO.	TIME (Z)	FIX POSITION	ACQRY	ORIGIN CODE	SATellite	COMMENTS	SITE
1	070012	17.7N 140.7E	PCN 5	TU.0/0.0	DMSP02W	INIT JDS/PNO CNTR AT 113N 1470E	PGTW
2	070935	17.7N 137.5E	PCN 6		DMSP02W	PSN USJ ON UH FLOW	PGTW
3	071254	14.5N 130.4E	PCN 5		DMSP02W	PSN MBLCTD ESTWNU	PGTW
4	072034	14.7N 135.4E	PCN 6		DMSP02W		PGTW
5	080032	15.6N 135.6E	PCN 5	T1.5/1.5 /01.5/24HRC	DMSP02W		PGTW
6	080914	14.2N 137.5E	PCN 5		DMSP02W		PGTW
7	080914	14.2N 137.5E	PCN 5		DMSP02W		RODN
8	081234	14.4N 131.4E	PCN 5		DMSP02W		PGTW
9	081234	14.4N 131.4E	PCN 5		DMSP02W		RODN
10	081314	14.4N 131.7E	PCN 5		DMSP02W		PGTW
11	082155	14.0N 130.1E	PCN 5		DMSP02W	ULC 103N 1294E	PGTW
12	080014	14.0N 120.7E	PCN 3	T2.5/2.5-/01.0/24HRC	DMSP02W		PGTW
13	080115	15.7N 120.4E	PCN 3		DMSP02W		PGTW
14	080115	15.7N 120.7E	PCN 5	T2.0/2.0	DMSP02W	INIT JDS	RPMK
15	081035	14.0N 120.7E	PCN 5		DMSP02W		PGTW
16	081256	14.4N 120.4E	PCN 5		DMSP02W		PGTW
17	081255	14.2N 120.9E	PCN 5		DMSP02W		RPMK
18	081350	14.4N 120.3E	PCN 6		DMSP02W		RPMK
19	082134	17.0N 120.2E	PCN 6	T2.0/2.5 /40.5/21HRC	DMSP02W		PGTW
20	082355	17.7N 120.3E	PCN 5		DMSP02W		PGTW
21	100056	17.4N 120.7E	PCN 5		DMSP02W	EDGE OF DATA	RODN
22	100056	17.5N 120.3E	PCN 5		DMSP02W		PGTW
23	101015	14.7N 120.3E	PCN 5		DMSP02W		PGTW
24	101238	14.4N 127.5E	PCN 5		DMSP02W		PGTW
* 25	101337	17.5N 127.6E	PCN 5		DMSP02W		PGTW
* 26	101337	17.5N 127.6E	PCN 5		DMSP02W		PGTW
27	102113	14.4N 120.6E	PCN 4		DMSP02W	EAPSD 4LRC	PGTW
28	102337	14.4N 120.5E	PCN 3		DMSP02W		PGTW
29	110219	14.7N 120.4E	PCN 3	T1.0/1.0	DMSP02W	INIT JDS	PGTW
30	110218	14.4N 120.4E	PCN 3	T1.0/1.5 /41.0/27HRC	DMSP02W		PGTW
31	110954	14.4N 120.2E	PCN 5		DMSP02W		PGTW
32	111219	14.4N 120.2E	PCN 2		DMSP02W		PGTW
33	111318	14.7N 120.1E	PCN 3		DMSP02W		PGTW
34	111318	14.3N 120.5E	PCN 3		DMSP02W		RKSO
35	122234	14.4N 127.2E	PCN 3	T1.0/1.0 /50.0/20HRC	DMSP02W		RODN
36	120100	14.3N 127.2E	PCN 3		DMSP02W		PGTW
37	122214	17.1N 125.2E	PCN 3		DMSP02W		PGTW
38	130043	14.9N 124.6E	PCN 3	T3.0/3.0	DMSP02W	INIT JDS	RPMK
39	130043	17.0N 124.6E	PCN 3		DMSP02W		PGTW
40	130140	14.3N 124.5E	PCN 3		DMSP02W		RPMK
41	130140	14.4N 124.4E	PCN 3	T1.0/1.0	DMSP02W	INIT JDS	PGTW
42	130515	14.3N 127.0E	PCN 4		DMSP02W		PGTW
43	131324	15.4N 122.4E	PCN 5		DMSP02W		PGTW
44	131325	15.4N 122.3E	PCN 3		DMSP02W		RODN

ATCRAFT FIXES

FIX NO.	TIME (Z)	FIX POSITION	FLT LVL	TUO43 OBS	MAX-SFC-WND	MAX-FLT-LVL-WND	APPROV	EYE SHAPE	EYE ORIENT	WIND TEMP (C)	WIND
1	082027	15.4N 130.1E	700MM	7047		110	32 080 14 10 3			+13 +12	5
2	082153	15.4N 130.1E	700MM	7046	993	40 130 15 100	37 300 14 4 3			+14 +11	5
3	080928	15.4N 120.4E	700MM	7024	990	45 270 10 100	51 070 12 4 4			+14 +11	6
4	081947	17.3N 120.2E	700MM	7004		170	35 090 30 4 4			+10 +11	7
5	082140	17.4N 120.2E	700MM	7010		50 060 20 100	38 060 30 4 4			+10 +11	7
6	102306	17.3N 120.4E	700MM	7035		210	27 230 14 4 2			+13 +10	4
7	102213	14.5N 120.6E	700MM	7071		35 140 75 230	30 140 90 4 4			+14 +8	4
8	110540	14.4N 120.4E	700MM	7065		35 210 30 000	30 320 90 4 10			+15 +11	10
9	110425	14.4N 120.5E	700MM	7079	995	20 180 30 150	17 010 30 4 4			+14 +10	10
10	120515	14.1N 126.4E	1500FT	1003		40 220 30 000	48 010 180 4 4			+23 +24	11
11	120558	14.2N 126.5E	700MM	7124	1001						

SYNOPTIC FIXES

FIX NO.	TIME (Z)	FIX POSITION	INTENSITY ESTIMATE	NEAREST DATA (MM)	COMMENTS
1	070000	0.2N 141.5E	17	190	

## TROPICAL DEPRESSION 26

## SATELLITE FIXES

FIA NO.	TIME (Z)	FIX POSITION	ACQRY	UNIQUE CODE	SATELLITE	COMMENTS	SITE
1	202255	11.24 154.4E	PCN 3		DMSPD1A	LL LAR	PGTW
2	301137	14.14 154.5E	PCN 5		DMSPD1A	ULCC	PGTW
3	302238	14.74 152.5E	PCN 3	72.0/2.0	DMSPD1A	INIT OBS	PGTW
4	010056	14.74 152.0E	PCN 3		DMSPD1A		PGTW
5	010907	20.34 152.2E	PCN 6		DMSPD1A		PGTW
6	011119	20.34 151.1E	PCN 6		DMSPD1A		PGTW
7	011156	20.34 151.0E	PCN 5		DMSPD1A		PGTW
8	012048	22.64 150.6E	PCN 5		DMSPD1A		PGTW
9	012219	22.64 151.0E	PCN 5	71.0/2.0-71.0/2.0HRS	DMSPD1A		PGTW
10	012219	21.24 149.0E	PCN 5		DMSPD1A	RELOCATED	PGTW
11	020037	24.34 149.7E	PCN 3		DMSPD1A	LLCC	PGTW

## AIRCRAFT FIXES

FIA NO.	TIME (Z)	FIX POSITION	FLT IFL	70043 OBS MUT	70043 OBS MSLP	MAX-SFC-WIND VEL/4RG/RWG	MAX-FLI-LVL-4NN IIR/VEL/8MG/4MG	ACQRY NAV/MET	EYE SHAPE	EYE ORIEN-DIAG/TATION	EYE TEMP (F) DUT/ 14/ 3P/4ST	WSN NO.
1	011913	21.04 149.0E	700MM	3091			270 27 200 40	4 4			+15	3
2	012144	21.04 149.0E	700MM	3102	1001	40 090	5 244 35 200 20	4 4			+11 +14 + 6	3

## SYNOPTIC FIXES

FIA NO.	TIME (Z)	FIX POSITION	INTENSITY ESTIMATE	NEAREST DATA (MM)	COMMENTS
1	021200	24.24 152.1E	15	120	

# TYPHOON ABBY

## SATELLITE FIXES

FLA NO.	TIME (Z)	STX POSITION	ACFRY	SVT3AK CODE	SATELLITE	COMMENTS	SITE
1	012238	4,200 180.0E	PCN 5	T1-5/1.5	DMS03A	INIT JDS	PGTW
2	010507	4,200 180.2E	PCN 5		DMS03A		PGTW
3	011114	4,200 180.4E	PCN 5		DMS03A		PGTW
4	011155	4,200 180.2E	PCN 5		DMS03A		PGTW
5	012214	4,200 180.2E	PCN 5	T3-0/3.0 /11.5/24HRS	DMS03A		PGTW
6	020740	4,200 180.2E	PCN 5		DMS03A		PGTW
7	021101	4,200 180.4E	PCN 5		DMS03A		PGTW
8	021135	4,200 180.2E	PCN 5		DMS03A		PGTW
9	022201	4,200 180.0E	PCN 5		DMS03A		PGTW
10	030015	4,200 180.2E	PCN 5	T3-5/3.5 /10.5/24HRS	DMS03A		PGTW
11	031042	4,200 180.2E	PCN 5		DMS03A		PGTW
12	031117	4,200 180.4E	PCN 5		DMS03A		PGTW
13	031514	4,200 180.4E	PCN 5		TTW05N		KGWC
14	032326	4,200 180.4E	PCN 3		DMS03A		PGTW
15	032358	4,200 180.2E	PCN 3	T4-0/4.0 /10.5/24HRS	DMS03A		PGTW
16	041024	4,200 180.1E	PCN 5		DMS03A		PGTW
17	041058	4,200 180.0E	PCN 5		DMS03A		PGTW
18	042305	4,200 180.2E	PCN 5		DMS03A		PGTW
19	042334	4,200 180.4E	PCN 5	T4-0/4.0 /50.0/24HRS	DMS03A		PGTW
20	041147	4,200 180.2E	PCN 5		DMS03A		PGTW
21	041200	4,200 180.2E	PCN 5		DMS03A		PGTW
22	041734	4,200 180.2E	PCN 5		TTW05N	APRNT LFC INDICATED 10 N	PGTW
23	042248	4,200 180.1E	PCN 5		DMS03A		KGWC
24	042314	4,200 180.2E	PCN 5	T4-0/4.0 /50.0/24HRS	DMS03A	2ND CIRC AT 084N 1504E	PGTW
25	041124	4,200 180.4E	PCN 5		DMS03A		PGTW
26	041201	4,200 180.2E	PCN 5		DMS03A	UL CNTR AT 105N 1479E	PGTW
27	041724	4,200 180.0E	PCN 5		TTW05N		KGWC
28	070511	11,200 180.7E	PCN 5	T3-5/4.0 /10.5/24HRS	DMS03A		PGTW
29	071042	11,200 180.6E	PCN 5		DMS03A		PGTW
30	071111	11,200 180.3E	PCN 5		DMS03A		PGTW
31	071141	11,200 180.2E	PCN 5		DMS03A		PGTW
32	072352	11,200 180.5E	PCN 5	T2-5/3.5 /11.0/24HRS	DMS03A		PGTW
33	040022	11,200 180.7E	PCN 5	T2-5/2.5	DMS03A	INIT JDS	ROUN
34	040022	11,200 180.3E	PCN 5		DMS03A		PGTW
35	041234	11,200 180.1E	PCN 5		DMS03A		PGTW
36	041303	11,200 180.6E	PCN 5		DMS03A	UPN LVL	ROUN
37	041303	11,200 180.1E	PCN 5		DMS03A		PGTW
38	042334	11,200 180.4E	PCN 5	T3-0/3.0 /10.5/24HRS	DMS03A		PGTW
39	050144	11,200 180.0E	PCN 5		DMS03A		PGTW
40	051215	11,200 180.4E	PCN 5		DMS03A		PGTW
41	051244	11,200 180.4E	PCN 5		DMS03A		ROUN
42	051244	11,200 180.2E	PCN 5		DMS03A		PGTW
43	051437	11,200 180.2E	PCN 5		TTW05N		KGWC
44	100054	11,200 180.5E	PCN 5		DMS03A		PGTW
45	100125	11,200 180.4E	PCN 5	T4-0/4.0 /11.0/24HRS	DMS03A		PGTW
46	101157	11,200 180.6E	PCN 5		DMS03A		PGTW
47	101157	11,200 180.5E	PCN 5		DMS03A		ROUN
48	101224	11,200 180.3E	PCN 5		DMS03A		PGTW
49	111426	11,200 180.3E	PCN 5		TTW05N		KGWC
50	110034	11,200 180.6E	PCN 5		DMS03A		PGTW
51	110105	11,200 180.4E	PCN 5	T4-5/4.5	DMS03A	INIT JDS	ROUN
52	110105	11,200 180.4E	PCN 3	T3-0/5.0 /11.0/24HRS	DMS03A		PGTW
53	111320	11,200 180.4E	PCN 1		DMS03A		PGTW
54	111345	11,200 180.4E	PCN 2		DMS03A		PGTW
55	111345	11,200 180.3E	PCN 1	T3-0/5.0	DMS03A	INIT JDS	ROUN
56	120021	11,200 180.7E	PCN 1		DMS03A		PGTW
57	120046	11,200 180.6E	PCN 1	T3-0/5.0 /50.0/24HRS	DMS03A		PGTW
58	120046	11,200 180.4E	PCN 1	T3-0/5.0 /10.5/24HRS	DMS03A		ROUN
59	120227	11,200 180.4E	PCN 1		DMS03A		ROUN
60	120700	11,200 180.2E	PCN 2		TTW05N		KGWC
61	121302	11,200 180.4E	PCN 3		DMS03A		PGTW
62	121327	11,200 180.1E	PCN 3		DMS03A		ROUN
63	121327	11,200 180.4E	PCN 3		DMS03A		PGTW
64	120003	11,200 180.7E	PCN 3	T4-5/4.0 /10.5/24HRS	DMS03A		PGTW
65	130205	21,200 180.3E	PCN 1		DMS03A		PGTW
66	130205	21,200 180.2E	PCN 1	T4-0/5.0 /11.0/24HRS	DMS03A		ROUN
67	131244	21,200 180.5E	PCN 5		DMS03A		PGTW
68	131305	21,200 180.5E	PCN 5		DMS03A		PGTW
69	131305	21,200 180.2E	PCN 5		DMS03A		ROUN
70	131753	21,200 180.4E	PCN 5		TTW05N		KGWC
71	132345	21,200 180.5E	PCN 1	T4-0/4.0 /50.0/24HRS	DMS03A		ROUN
72	132345	21,200 180.1E	PCN 5		DMS03A		PGTW
73	140007	21,200 180.5E	PCN 5	T4-0/4.5 /10.5/24HRS	DMS03A		PGTW

## ATCRAFT FIXES

FLA NO.	TIME (Z)	STX POSITION	FLT LVL	70044 HGT	JDS MSLP	MAX-SFC-WND VFL/ARG/ANG	MAX-FLT-LVL-WND DTH/VFL/ARG/ANG	ACFRY NAV/MFT	EYE SHAPE	EYE ORIEN- JIRAMTATION	EYE TEMP (F) DIR/ 1W/ DP/ECT	WSN NO.
1	012215	4,200 180.4E	700MM	1074	996	45 050 15	040 36 020 50	1 4			+20 +25 +23	1
2	020210	4,200 180.1E	700MM	1074	996	40 050 25	040 39 360 12	2 5			+4 +11	2
3	030920	4,200 180.2E	700MM	1064	998		110 34 360 24	1 5			+4 +10 +9	3
4	031302	4,200 180.0E	700MM	1049	995		140 38 110 20	2 2			+10 +14	4
5	032130	4,200 180.2E	700MM	1050	994	55 030 15	140 40 070 60	4 5			+4 +14 +10	5
6	040104	4,200 180.2E	700MM	1050	994	50 010 25	040 41 340 00	4 5			+11 +14 +10	6
7	040718	4,200 180.4E	700MM	1013	987	40 140 10	040 50 270 54	4 5			+4 +14 +10	7
8	050154	4,200 180.4E	700MM		986	40 270 10	040 53 330 20	2 4			+14 +18 +10	8
9	050740	4,200 180.4E	700MM	1101			140 53 330 60	1 9			+12 +13 +12	9
10	061500	4,200 180.0E	700MM	1083			50 050 15	4 4			+12 +13 +9	10
11	061421	4,200 180.4E	700MM	1070	1001		50 350 60	7 4			+12 +12 +12	11
12	062150	4,200 180.4E	700MM	1134	1000	50 090 10	070 45 310 50	2 4			+10 +14 +6	12

13	040051	4.40	141.4E	700MM	1135	35	170	35	040	41	300	90	2	3			
14	040215	4.40	141.7E	700MM	1127	1002	40	220	30	120	41	300	90	4	4		
15	040335	4.40	140.9E	700MM	1094	1000	40	290	30	040	47	240	150	10	4	+14	+16 + 7
16	041205	4.30	140.7E	700MM	1090					130	10	240	30			+14	+13 +12
17	041402	4.60	140.4E	700MM	1090	1002				260	28	160	135	4	20	+14	+11 +10
18	042030	4.60	140.1E	700MM	1000		25	150	25	090	51	350	120	4	5		
19	042127	10.00	140.8E	700MM		995	50	050	25	140	52	050	22	4	20	+25	+25 +22
20	071503	10.20	140.7E	700MM	1050	996				230	30	150	20	4	5	+12	+13 +10
21	071907	10.20	140.8E	700MM	1053					140	33	090	90	4	5	+15	+ 7
22	072128	11.10	140.8E	700MM	1062	996	35	020	40	140	43	040	80	4	5	+14	+15 +11
23	080553	12.20	141.6E	700MM	1084		30	020	30	110	34	020	35	4	5		
24	080558	11.40	142.4E	700MM	1092					180	27	100	110	10	5	+14	+13 +10
25	081938	11.30	139.7E	700MM	1045					150	23	070	4	14	10	+13	+10
26	082126	11.50	139.4E	700MM	1084		25	230	15	140	22	070	60	10	5	+15	+ 9
27	090617	11.20	137.6E	700MM	1064		35	100	30	100	39	300	40	4	5	+15	+ 7
28	090812	10.50	136.3E	700MM	2992	988	40	360	5	110	74	360	10	4	5	+ 4	+15 + 6
29	091934	10.30	134.4E	700MM	2925					040	61	330	30	4	5	+15	+ 9
30	092207	11.10	134.2E	700MM	2935		60	190	25	140	55	090	30	4	5		
31	102247	11.50	130.4E	700MM	2797	964	40	120	35	170	78	120	35	4	5	+12	+21 + 9
32	110554	14.30	130.2E	700MM	2792		75	300	10	110	85	230	60	4	5	+13	+10
33	110927	14.40	130.1E	700MM	2774	963	75	030	13	240	76	140	74	4	5	+14	+15 +10
34	112149	14.20	130.3E	700MM	2682	954	100	110	30	200	105	130	30	4	5	+14	+19 +11
35	122105	14.40	131.4E	700MM	2681					120	84	270	14	4	5		
36	122214	14.50	134.0E	700MM	2663	951	30	310	30	220	106	120	30	4	5		+14
37	120906	20.70	136.8E	700MM	2762	962	110	180	20	260	118	170	25	4	7	+13	+19 + 9
38	131938	22.10	141.4E	700MM	2934					180	75	080	30	4	5	+17	+ 3
39	142220	22.20	142.0E	700MM	1002		40	150	50	230	45	080	30	4	10	+ 4	+17 + 9
40	140737	22.70	145.5E	1500FT		1001	40	270	15	240	39	070	45	4	2		

# SYNOPTIC FIXES

FIX NO.	TIME (Z)	FIX POSITION	INTENSITY ESTIMATE	NEAREST DATA (NM)	COMMENTS
1	200000	7.00 140.0E	15	100	
2	300000	7.00 140.5E	15	120	
3	141200	21.00 140.0E	20	200	

## TROPICAL STORM BEN

## SATELLITE FIXES

FIX NO.	TIME (Z)	FIX POSITION	ACCR	ORIGIN CODE	SATELLITE	COMMENTS	SITE
1	200134	11.7N 122.0E	PCN 5		DMS030		PGTW
2	201217	11.7N 120.9E	PCN 5		DMS030		PGTW
3	210059	11.5N 127.0E	PCN 3	T2.0/2.0	DMS030	INIT JDS	PGTW
4	210114	11.5N 126.9E	PCN 3		DMS030		PGTW
5	210114	11.5N 126.7E	PCN 5	T2.0/2.0	DMS030	INIT JDS	RPMK
6	211340	11.7N 121.8E	PCN 5		DMS030		RQDN
7	211355	11.5N 121.8E	PCN 5		DMS030		PGTW
8	211355	11.5N 121.7E	PCN 5		DMS030		RPMK
9	211356	11.5N 121.4E	PCN 5		DMS030		RQDN
10	220041	12.4N 121.4E	PCN 5	T3.5/3.5 / 01.5/24HRS	DMS030		PGTW
11	220236	12.1N 121.0E	PCN 5	T3.5/3.5	DMS030	INIT JDS	RQDN
12	220237	12.5N 120.9E	PCN 5	T3.0/3.0 / 01.0/24HRS	DMS030		RPMK
13	220652	13.5N 119.4E	PCN 5		TH03N		KGWC
14	221322	13.9N 119.1E	PCN 5		DMS030		PGTW
15	221336	13.9N 119.2E	PCN 5		DMS030		PGTW
16	230023	14.3N 119.3E	PCN 5	T2.5/3.5 / 01.0/24HRS	DMS030		PGTW
17	230204	15.7N 119.6E	PCN 5		DMS030		RQDN
18	230217	16.3N 119.7E	PCN 5		DMS030		PGTW
19	230217	15.5N 119.3E	PCN 5	T2.5/3.0 / 00.5/24HRS	DMS030		RPMK
20	230640	14.0N 121.3E	PCN 5		TH03N		KGWC
21	231304	20.0N 121.9E	PCN 5		DMS030		PGTW
22	231317	20.0N 124.1E	PCN 5		DMS030		PGTW

## AIRCRAFT FIXES

FIX NO.	TIME (Z)	FIX POSITION	FLY LVL	Y0043	DRS	MAX-SFC-WND	MAX-FLY-LVL-WND	ACCR	EYE SHAPE	EYE ORIENT	WV TEMP (Z)	WSN NO.
1	210620	11.5N 125.4E	700MH	3047	392	50 030	20 100	46 330	60	4 5	+11 +11	1
2	212225	12.5N 122.3E	700MH			50 350	10 210	38 120	60	3 4		2
3	220913	13.4N 119.4E	700MH	3013	906	70 320	10 120	72 050	15	1 3	+13 + 8	4
4	222239	15.5N 119.4E	700MH	3052	995	70 020	12 170	56 090	15	2 2	+14 + 9	6

## RAJAH FIXES

FIX NO.	TIME (Z)	FIX POSITION	RAJAH	ACCR	EYE SHAPE	EYE DIAM	RAJAH-CODE	COMMENTS	RAJAH POSITION	WMO NO.
1	210710	12.0N 125.2E	LAND				10017 / 11111		10.3N 124.0E	98446
2	210940	12.9N 124.2E	LAND				10010 5/111		10.3N 124.0E	98446
3	211100	12.0N 124.2E	LAND				12013 52714		10.3N 124.0E	98446
4	211200	11.9N 121.4E	LAND				10130 52618		10.3N 124.0E	98446
5	211300	11.9N 121.4E	LAND				25240 52620		10.3N 124.0E	98446
6	220700	13.5N 119.4E	LAND	FAIR	CIRCULAR	20			15.2N 123.6E	98327
7	221900	15.2N 119.4E	LAND		CIRCULAR				15.2N 120.6E	98327

AD-A082 071

NAVAL OCEANOGRAPHY COMMAND CENTER/JOINT TYPHOON WARNI--ETC F/6 4/2  
ANNUAL TYPHOON REPORT 1979.(U)  
1979 J W DIERCKS, J K LAVIN, J H BELL

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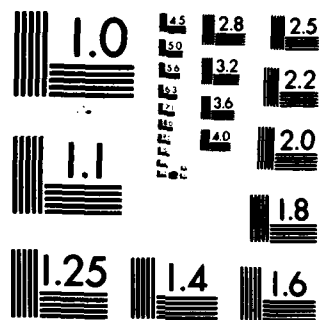
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DTIC



MICROCOPY RESOLUTION TEST CHART  
NATIONAL BUREAU OF STANDARDS-1963-A

## 2. NORTH INDIAN OCEAN CYCLONE FIX DATA

TC 17-79

KATELITE FIXES

FIX NO.	TIME (Z)	FIX POSITION	ACRY	DVORAK CODE	SATFILLITE	COMMENTS	SITE
1	062354	4.4N 80.7E	PCN 6	T1.0/1.0	DWSP17	CNTN BASED ON IPR LVL OUTFLOW	KRMC
2	061240	7.7N 87.0E	PCN 6	T1.0/1.0	DWSP17	POSIT BASED ON IPR LVL ANTICYCLONE	KRMC
3	061705	9.4N 88.5E	PCN 6	T1.0/1.0	DWSP17	INIT 305	KRMC
4	070121	7.4N 84.4E	PCN 6	T1.0/1.0	DWSP17		KRMC
5	070509	4.0N 87.0E	PCN 6	T2.5/2.5 /D1.5/24HR	DWSP17		KRMC
6	071220	4.0N 86.0E	PCN 6		DWSP17	EDGE OF DATA POSIT BASED CURV	KRMC
7	071647	7.0N 84.7E	PCN 6		DWSP17		KRMC
8	080100	5.0N 86.1E	PCN 4	T3.0/3.0 /D0.5/10HR	DWSP17	APPROX LOW LVL CIRC	KRMC
9	080520	5.7N 86.3E	PCN 1	T0.0/4.0 /D1.5/24HR	DWSP17		KRMC
10	081341	4.1N 86.4E	PCN 1		DWSP17	STORM ON EAST EDGE OF PICTURE	KRMC
11	081910	7.2N 86.7E	PCN 2		DWSP17		KRMC
12	080800	7.2N 86.3E	PCN 2		DWSP17	EYE COVERED BY THIN CI CANOPY	KRMC
13	080800	7.0N 87.5E			TIMON	EYE UNSTABLE	FJDB
14	081321	4.7N 84.0E	PCN 4	T3.5/4.0 /D0.5/24HR	DWSP17	CTR BANDS ON CH BANDS	KRMC
15	081751	10.7N 84.5E	PCN 1		DWSP17	EYE HANGING	KRMC
16	100021	10.7N 84.0E	PCN 1		DWSP17		KRMC
17	100651	11.0N 84.5E	PCN 1	T5.0/5.0 /D1.0/24HR	DWSP17	EYE EMBEDDED	KRMC
18	101302	12.1N 84.0E	PCN 2		DWSP17	GOOD EYE GOOD CI OUTFLOW	KRMC
19	101736	15.0N 84.0E	PCN 1		DWSP17	EYE WELL DEFINED	KRMC
20	102115	17.0N 87.2E			TIMON	EYE WELL DEFINED EST. DTS	FJDB
21	102124	9.4N 86.3E			TIMON	EYE NOT USBL	FJDB
22	110001	12.0N 87.5E	PCN 2	T5.0/5.0 /D1.5/24HR	DWSP17	EYE ON EDGE OF DATA	KRMC
23	110142	12.7N 87.3E	PCN 2		DWSP17	EYE WELL DEFINED	KRMC
24	110615	17.0N 87.7E	PCN 2	T6.0/6.0 /D1.0/24HR	DWSP17	EYE WELL DEFINED AND EMBEDDED	KRMC
25	111001	14.3N 88.5E			TIMON	EYE WELL DEFINED	FJDB
26	111241	14.1N 87.0E	PCN 2	T6.0/6.0 /D1.0/24HR	DWSP17	EYE NOT USBL RHE TO CI CANOPY	KRMC
27	111715	17.0N 81.2E	PCN 1		DWSP17	W EDGE OF DATA CI CAP OVER EYE	KRMC
28	120122	14.3N 81.0E	PCN 4		DWSP17	COO NAME OVN	KRMC
29	120556	14.7N 80.0E	PCN 4		DWSP17	EYE NOT USBL GOOD CI OUTFLOW	KRMC
30	121135	15.5N 78.0E			TIMON	EYE DEFINABLE FST. DTS	FJDB
31	121602	16.7N 79.1E	PCN 4		DWSP17	EYE NOT USBL	KRMC
32	120102	16.4N 78.0E	PCN 6		DWSP17	UPR LVL ANTICYCLONE	KRMC
33	120530	16.0N 77.0E	PCN 6	T3.0/4.0 /D2.0/24HR	DWSP17		KRMC

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KATELITE FIXES

FIX NO.	TIME (Z)	FIX POSITION	ACRY	DVORAK CODE	SATFILLITE	COMMENTS	SITE
1	170645	14.0N 69.2E	PCN 6	T1.0/1.0	DWSP17	INIT OBS/ANTICYCLONE ALOFT	KRMC
2	171349	10.7N 71.1E	PCN 6		DWSP17		KRMC
3	171927	17.0N 66.0E	PCN 6		DWSP17		KRMC
4	180230	14.7N 64.0E	PCN 6		DWSP17	UPR LVL ANTICYCLONE CI OUTFLOW	KRMC
5	180627	17.7N 64.2E	PCN 4	T2.0/2.0 /D1.0/24HR	DWSP17		KRMC
6	181100	18.1N 60.0E	PCN 6		TIMON		KRMC
7	181311	18.2N 67.0E	PCN 6		DWSP17		KRMC
8	181909	18.0N 67.6E	PCN 6		DWSP17	POSIT BASED ON EXTRAP	KRMC
9	180800	18.0N 60.0E			TIMON		KRMC
10	180210	18.0N 60.7E	PCN 6		DWSP17		KRMC
11	180600	18.7N 60.1E	PCN 5	T2.5/2.5 /D0.5/24HR	DWSP17		KRMC
12	180750	18.3N 60.3E	PCN 5		DWSP17	ON EDGE OF DATA	KRMC
13	181139	14.7N 57.0E			TIMON		KRMC
14	181650	10.0N 60.5E	PCN 5	T2.5/2.5 /D0.5/24HR	DWSP17	BASED ON EXPANDED LLC	KRMC
15	181950	10.1N 60.7E	PCN 6		DWSP17	POSIT BASED ON EXTRAP	KRMC
16	182300	10.0N 58.0E			TIMON		KRMC
17	200150	10.1N 57.0E	PCN 6	T2.0/2.5 /D0.5/24HR	DWSP17		KRMC
18	200731	10.3N 56.0E	PCN 5		DWSP17		KRMC
19	201630	21.4N 56.0E	PCN 6		DWSP17	POSIT BASED ON EXTRAP	KRMC
20	210619	10.4N 57.1E	PCN 5	T1.0/2.0 /D1.0/24HR	DWSP17		KRMC

SYNOPTIC FIXES

FIX NO.	TIME (Z)	FIX POSITION	INTENSITY ESTIMATE	NEAREST DATA (NM)	COMMENTS
1	171200	17.5N 67.0E	30	40	
2	171800	18.0N 64.5E	30	20	
3	180800	18.0N 58.0E	45	60	
4	181200	19.0N 60.0E	35	80	
5	211500	21.0N 56.5E	15	200	

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SATELLITE FIXES

FIX NO.	TIME (Z)	FIX POSITION	ACCRV	DVDRK CODE	SATFLITE	COMMENTS	SITE
1	211200	9.5N 84.0E			TIROK4		KNSS
2	211340	11.5N 84.4E	PCN 6		DWSP17	INIT JGS	KOMC
3	211602	12.0N 84.2E	PCN 6		DWSP10	INIT JGS	KOMC
4	220039	14.6N 87.2E	PCN 6	T1.5/1.5	DWSP17		KOMC
5	220100	13.5N 87.1E			TIROK4		KNSS
6	220443	14.3N 86.0E	PCN 6		DWSP10		KOMC
7	221320	15.0N 89.0E	PCN 6	T1.5/1.5	DWSP17	INIT JGS	KOMC
8	221543	15.7N 89.4E	PCN 6		DWSP10	INIT JGS	KOMC
9	220413	16.0N 81.2E	PCN 6	T1.5/1.5	DWSP1A	INIT JGS/PSN BASED ON COMV	KOMC
10	220424	16.0N 81.3E	PCN 6	T1.5/1.5 /00.5/24HR	DWSP10	PSN BASED ON CENTER OF COMV	KOMC

SYNOPTIC FIXES

FIX NO.	TIME (Z)	FIX POSITION	INTENSITY ESTIMATE	NEAREST DATA (NM)	COMMENTS
1	200000	9.0N 88.0E	20	250	
2	201200	10.0N 87.0E	20	200	

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SATELLITE FIXES

FIX NO.	TIME (Z)	FIX POSITION	ACCRV	DVDRK CODE	SATFLITE	COMMENTS	SITE
1	180559	12.6N 71.0E	PCN 5	T1.0/1.0	DWSP10	INIT JGS/CENTER BASED ON LLCC	KOMC
2	181441	12.6N 70.1E	PCN 6		DWSP17		KOMC
3	180140	14.6N 70.4E	PCN 5	T2.0/2.0 /01.0/24HR	DWSP17		KOMC
4	180443	14.1N 71.3E	PCN 5		DWSP10		KOMC
5	180541	14.1N 71.9E	PCN 5		DWSP10		KOMC
6	181421	14.0N 69.0E	PCN 6		DWSP17		KOMC
7	181640	13.5N 68.7E	PCN 6		DWSP10		KOMC
8	200120	14.4N 70.3E	PCN 6	T0.5/1.5 /01.5/24HR	DWSP17	PSN BSU ON CNTR OF COMV/NO LIC	KOMC
9	200512	15.6N 70.4E	PCN 6		DWSP10		KOMC
10	201015	15.0N 69.0E			TIROK4		KNSS
11	201400	15.9N 69.0E	PCN 6		DWSP17		KOMC
12	201606	16.7N 69.4E	PCN 6		DWSP10	PSN BSU ON APPROX LLCC	KOMC
13	210059	16.7N 69.0E	PCN 6		DWSP17	PSN BSU ON APPROX LLCC	KOMC
14	210321	16.0N 69.5E	PCN 4		DWSP10		KOMC
15	211100	18.0N 68.0E	PCN 4		TIROK4		KNSS
16	211340	17.9N 69.4E	PCN 6	T1.0/1.0 /00.5/24HR	DWSP17		KOMC
17	211447	16.6N 87.0E			TIROK4		PJBJ
18	220039	18.5N 64.2E	PCN 3	T3.0/3.0 /02.0/24HR	DWSP17		KOMC
19	220100	17.7N 64.4E			TIROK4		KNSS
20	220221	18.4N 64.2E	PCN 3		DWSP17		KOMC
21	220625	18.8N 64.7E	PCN 3		DWSP10		KOMC
22	221130	19.0N 64.2E			TIROK4		KNSS
23	221501	19.4N 64.3E	PCN 6		DWSP17	UPR LVL OUTFLW GOOD	KOMC
24	221712	20.7N 67.3E	PCN 6		DWSP10		KOMC
25	221724	19.5N 67.5E	PCN 6	T3.0/3.0 /02.0/24HR	DWSP10	PSN BASED ON CENTER OF COMV	KOMC
26	220200	19.7N 67.4E	PCN 4	T2.0/3.0 /01.0/24HR	DWSP17		KOMC
27	220413	19.6N 67.3E	PCN 3		DWSP10		KOMC
28	220606	19.7N 67.2E	PCN 3		DWSP10	PSN BASED ON EXPOSED LLC	KOMC
29	221100	19.1N 61.0E	PCN 6	T2.0/3.0 /01.0/24HR	TIROK4		KNSS
30	221441	20.0N 61.0E	PCN 6		DWSP17		KOMC
31	221705	20.3N 60.0E	PCN 6		DWSP10	POSIT GSN ON FIXTRAP	KOMC
32	240140	20.4N 60.1E	PCN 3	T1.0/2.0 /01.0/24HR	DWSP17		KOMC
33	240354	20.3N 60.0E	PCN 3		DWSP10		KOMC
34	240547	19.4N 59.4E	PCN 6		DWSP10	GOOD LL FLD TIME/NO CDO	KOMC
35	241421	19.4N 58.0E	PCN 6		DWSP17	PSN-DS BCD ON LL CU LINE	KOMC
36	241646	19.4N 58.1E	PCN 6		DWSP10	COMV VAL/POSIT NSD ON LLC	KOMC

SYNOPTIC FIXES

FIX NO.	TIME (Z)	FIX POSITION	INTENSITY ESTIMATE	NEAREST DATA (NM)	COMMENTS
1	241000	20.4N 57.0E	10	200	

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## SATELLITE PAGES

FIA NO.	TIME (Z)	FIX POSITION	ACQRY	DUPLICATE CODE	SATellite	COMMENTS	SITE
1	201626	10.24 09.5E	PCN 0	70.5/0.5	DWSP04	INIT J05	KOMC
2	202350	10.24 01.5E	PCN 0	71.5/1.5	DWSP07		KOMC
3	200164	10.24 00.0E	PCN 0		TIM004	INIT J05	FJBJ
4	200333	11.24 00.7E	PCN 0		DWSP04		KOMC
5	200440	11.24 00.3E	PCN 0		DWSP04		KOMC
6	201230	12.24 00.0E	PCN 0		DWSP07		KOMC
7	201506	12.24 00.3E	PCN 0		DWSP04		KOMC
8	300130	12.24 00.1E	PCN 0		TIM004		FJBJ
9	300315	12.24 00.5E	PCN 5	71.5/1.5	DWSP04		KOMC
10	300027	11.00 00.7E	PCN 5	71.5/1.5 /50.0/20MR	DWSP00		KOMC
11	301210	11.00 00.0E	PCN 0		DWSP07		KOMC
12	301527	12.00 00.3E	PCN 0		DWSP04		KOMC
13	302230	12.00 00.0E	PCN 0		DWSP04		KOMC
14	310050	13.24 00.3E	PCN 5	72.0/2.0 /00.5/20MR	DWSP07		KOMC
15	310257	13.24 00.7E	PCN 5		DWSP04		KOMC
16	310000	13.24 00.1E	PCN 5		DWSP00		KOMC
17	310000	12.00 00.5E	PCN 0		TIM004		FJBJ
18	311339	13.24 00.7E	PCN 5		DWSP07		KOMC
19	010030	12.30 01.0E	PCN 5	70.5/2.5 /00.5/20MR	DWSP07		KOMC
20	010530	12.24 00.0E	PCN 5		DWSP04		KOMC
21	011310	12.24 70.0E	PCN 0		DWSP07		KOMC
22	011630	11.24 70.0E	PCN 0		DWSP04		KOMC

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## SATELLITE PAGES

FIA NO.	TIME (Z)	FIX POSITION	ACQRY	DUPLICATE CODE	SATellite	COMMENTS	SITE
1	100502	11.24 72.2E	PCN 0	70.4	DWSP04	INIT J05	KOMC
2	101017	10.24 70.1E	PCN 0		DWSP07		KOMC
3	101040	11.00 00.0E	PCN 5		DWSP04		KOMC
4	100110	12.00 00.5E	PCN 5		DWSP04		KOMC
5	100520	12.00 00.7E	PCN 5	70.5/0.5 /50.0/20MR	DWSP04		KOMC
6	101705	14.00 00.5E	PCN 0		DWSP07		KOMC
7	100005	13.10 70.0E	PCN 5	70.5/0.5 /50.0/20MR	DWSP04	EXP00 ULFC	KOMC
8	101330	10.00 00.0E	PCN 0		DWSP07		KOMC
9	101705	14.00 00.7E	PCN 0		DWSP04		KOMC
10	100210	10.24 00.5E	PCN 0		DWSP07		KOMC
11	100000	10.24 00.7E	PCN 5	71.5/1.5 /01.0/20MR	DWSP04	EXP00 ULFC	KOMC
12	101057	10.24 70.1E	PCN 0		DWSP07		KOMC
13	101000	17.24 70.0E	PCN 0		DWSP04		KOMC
14	170130	17.00 71.1E	PCN 5		DWSP07		KOMC
15	170527	10.24 00.0E	PCN 5	71.0/1.5 /00.5/20MR	DWSP04		KOMC
16	171030	10.00 70.1E	PCN 5		DWSP07		KOMC
17	171020	10.00 70.2E	PCN 0		DWSP04		KOMC

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## SATELLITE PAGES

FIA NO.	TIME (Z)	FIX POSITION	ACQRY	DUPLICATE CODE	SATellite	COMMENTS	SITE
1	201000	0.00 00.0E			DWSP04	UPR LVL RTR	KOMC
2	210033	0.00 00.0E			DWSP04	UPR LVL RTR	KOMC
3	210000	10.00 00.0E			DWSP04		KOMC
4	211314	10.24 01.0E	PCN 5		DWSP07	INIT J05	KOMC
5	211000	10.00 01.0E	PCN 0		DWSP04		KOMC
6	211010	7.24 01.0E	PCN 0		DWSP04		KOMC
7	200013	10.00 01.0E	PCN 0		DWSP07	ULAC	KOMC
8	201203	10.00 00.0E	PCN 0		DWSP07	ULAC	KOMC
9	201031	10.00 00.7E	PCN 0	70.0/0.5	DWSP04	INIT J05	KOMC
10	202303	10.24 00.1E	PCN 0		DWSP07	ULAC	KOMC
11	202303	10.24 00.2E	PCN 0		DWSP07		KOMC
12	200330	10.00 00.0E	PCN 5	70.5/0.5 /50.0/20MR	DWSP04		KOMC
13	200331	10.00 07.0E	PCN 5	70.0/0.0	DWSP04	INIT J05	KOMC
14	201233	12.00 00.3E	PCN 5		DWSP07		KOMC
15	201010	10.24 00.0E	PCN 5		DWSP04	LLCC	KOMC
16	200003	10.24 00.7E	PCN 5	70.0/2.0 /02.0/20MR	DWSP04	LLCC	KOMC
17	201303	13.00 00.1E	PCN 0		DWSP07		KOMC
18	200002	12.00 70.0E	PCN 0		DWSP07	ULAC	KOMC
19	200043	13.10 00.0E	PCN 5	71.0/2.0 /01.0/20MR	DWSP04	LLCC	KOMC
20	201031	10.24 77.0E	PCN 5		DWSP04		KOMC

## APPENDIX

### 1. CONTRACTIONS

AC&W	Aircraft Control and Warning System	ICAO	International Civil Aviation Organization
ACCRY	Accuracy	IR	Infrared
ACFT	Aircraft	KM	Kilometer(s)
AIREP	Aircraft Weather Report(s) (Commerical and Military)	KT	Knot(s)
ANT	Antenna	LLCC	Low Level Circulation Center
APT	Automatic Picture Transmission	LVL	Level
ARMO	Aerial Reconnaissance Weather Officer	M	Meter(s)
ATT	Attenuation	M/SEC	Meters per Second
AVG	Average	MAX	Maximum
AWN	Automated Weather Network	MB	Millibar(s)
BRG	Bearing	MET	Meteorological
CDO	Central Dense Overcast	MIN	Minimum
CI	Current Intensity	MOHATT	Modified Hatrack
CLD	Cloud	MSN	Mission
CLSD	Closed	NAV	Navigational
CNTR	Center	NAVPGSCOL	Naval Postgraduate School
CONF	Confidence (number)	NEDN	Naval Environmental Data Network
CPA	Closest Point of Approach	NEDS	Naval Environmental Display Station
DEG	Degree(s)	NEPRF	Naval Environmental Prediction Research Facility
DIAM	Diameter	NESS	National Environmental Satellite Service
DIR	Direction	NET	Near Equatorial Trough
DMSP	Defense Meteorological Satellite Program	NM	Nautical Mile(s)
EASTPAC	Eastern Pacific	NOAA	National Oceanic and Atmospheric Administration
ELEV	Elevation	NRL	Naval Research Laboratory
FLT	Flight	NTCC	Naval Telecommunications Center
GOES	Geostationary Operational Environmental Satellite	OBS	Observation(s)
HATRACK	Hurricane and Typhoon Tracking (numerical forecast)	PCN	Position Code Number
HGT	Height	PE	Primitive Equation
HPAC	Mean of XTRP and Climatology	PSBL	Possible
HU	Hurricane	PTLY	Partly
HR	Hour(s)	QUAD	Quadrant
HVY	Heavy	RADOB	Radar Observation
		RECON	Reconnaissance

RNG	Range
RPD	Rapid
SAT	Satellite
SFC	Surface
SLP (MSLP)	Sea Level Pressure (Minimum Sea Level Pressure)
SMS	Synchronous Meteorological Satellite
SPOL	Spiral Overlay
SRP	Selective Reconnaissance Program
STNRY	Stationary
SST	Sea Surface Temperature
ST	Super Typhoon
TC	Tropical Cyclone
TCARC	Tropical Cyclone Aircraft Reconnaissance Coordinator
TCM	Tropical Cyclone Model
TD	Tropical Depression
TIROS	Television Infrared Observation Satellite
TS	Tropical Storm
TY	Typhoon
TUTT	Tropical Upper Tropospheric Trough (Sadler, 1976)
VEL	Velocity
VIS	Visual
VSBL	Visible
WESTPAC	Western Pacific
WMO	World Meteorological Organization
WND	Wind
WRS	Weather Reconnaissance Squadron
XTRP	Extrapolation
Z	Zulu Time (Greenwich mean time)

## 2. DEFINITIONS

**BEST TRACK** - A subjectively smoothed path, versus a precise and very erratic fix-to-fix path, used to represent tropical cyclone movement.

**CENTER** - The axis or pivot of a tropical cyclone. Usually determined by wind, temperature or pressure distribution.

**CYCLONE** - A closed atmospheric circulation rotating about an area of low pressure (counterclockwise in the northern hemisphere)

**EPHEMERIS** - Position of a body (satellite) in space as a function of time. When no geographical reference is available for gridding satellite imagery, then only ephemeris gridding is possible which is solely based on the theoretical satellite position and is susceptible to errors from satellite pitch, orbit eccentricity and the non-spherical earth.

**EXPLOSIVE DEEPENING** - A decrease in the minimum sea level pressure of a tropical cyclone of 2.5 mb/hr for 12 hrs or 5.0 mb/hr for 6 hrs (ATR 1971).

**EXTRATROPICAL** - A term used in warnings and tropical summaries to indicate that a cyclone has lost its "tropical" characteristics. The term implies both poleward displacement from the tropics and the conversion of the cyclone's primary energy sources from release of latent heat of condensation to baroclinic processes. The term carries no implications as to strength or size.

**EYE** - "EYE" is used to describe the central area of a tropical cyclone when it is more than half surrounded by wall cloud.

**FUJIWARA EFFECT** - An interaction in which tropical cyclones within about 700 nm of each other begin to rotate cyclonically about one another. When intense tropical cyclones are within about 400 nm of each other, they may also begin to move closer to each other.

**MAXIMUM SUSTAINED WIND** - Maximum surface wind speed averaged over a 1-minute period of time. Peak gusts over water average 20 to 25 percent higher than sustained wind.

**RAPID DEEPENING** - A decrease in the minimum sea level pressure of a tropical cyclone of 1.25 mb/hr for 24 hrs (ATR 1971).

**RECURVATURE** - The turning of a tropical cyclone from an initial path toward the west of northwest to the north then northeast.

**SIGNIFICANT TROPICAL CYCLONE** - A tropical cyclone becomes "significant" with the issuance of the first numbered warning by the responsible warning agency.

**SUPER TYPHOON/HURRICANE** - A typhoon/hurricane in which the maximum sustained surface wind (1-minute mean) is 130 kt or greater.

**TROPICAL CYCLONE** - A nonfrontal low pressure system of synoptic scale developing over tropical or subtropical waters and having a definite organized circulation.

**TROPICAL CYCLONE AIRCRAFT RECONNAISSANCE COORDINATOR** - A CINCPACAF representative designated to levy tropical cyclone aircraft weather reconnaissance requirements on reconnaissance units within a designated area of the PACOM and to function as coordinator between CINCPACAF, aircraft weather reconnaissance units, and the appropriate typhoon/hurricane warning center.

**TROPICAL DEPRESSION** - A tropical cyclone in which the maximum sustained surface wind (1-minute mean) is 33 kt or less.

**TROPICAL DISTURBANCE** - A discrete system of apparently organized convection--generally 100 to 300 miles in diameter--originating in the tropics or subtropics, having a non-frontal migratory character, and having maintained its identity for 24 hours or more. It may or may not be associated with a detectable perturbation of the wind field. As such, it is the basic generic designation which, in successive stages of intensification, may be classified as a tropical depression, tropical storm or typhoon (hurricane).

**TROPICAL STORM** - A tropical cyclone with maximum sustained surface winds (1-minute mean) in the range of 34 to 63 kt, inclusive.

**TROPICAL UPPER TROPOSPHERIC TROUGH (TUTT)** - "A dominant climatological system, and a daily synoptic feature, of the summer season over the tropical North Atlantic, North Pacific and South Pacific Oceans," from Sadler, James C., Feb. 1976: Tropical Cyclone Initiation by the Tropical Upper Tropospheric Trough. (NAVENVPREDRSCHFAC Technical Paper No. 2-76)

**TYPHOON/HURRICANE** - A tropical cyclone in which the maximum sustained surface wind (1-minute mean) is 64 kt or greater. West of 180 degrees longitude they are called typhoons and east of 180 degrees they are called hurricanes. Foreign governments use these or other terms for tropical cyclones and may apply different intensity criteria.

**WALL CLOUD** - An organized band of cumuli-form clouds immediately surrounding the central area of a tropical cyclone. The wall cloud may entirely enclose the eye or only partially surround the center.

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20. ABSTRACT (Continue on reverse side if necessary and identify by block number) Annual publication summarizing the tropical cyclone season in the western North Pacific, Bay of Bengal and Arabian Sea. A brief narrative is given on each significant tropical cyclone including the best track. All reconnaissance data used to construct the best tracks are provided. Forecast verification data and statistics for the JTWC are summarized. Research efforts at the JTWC and NEPRF are discussed briefly.		

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